OCTOBER
1949

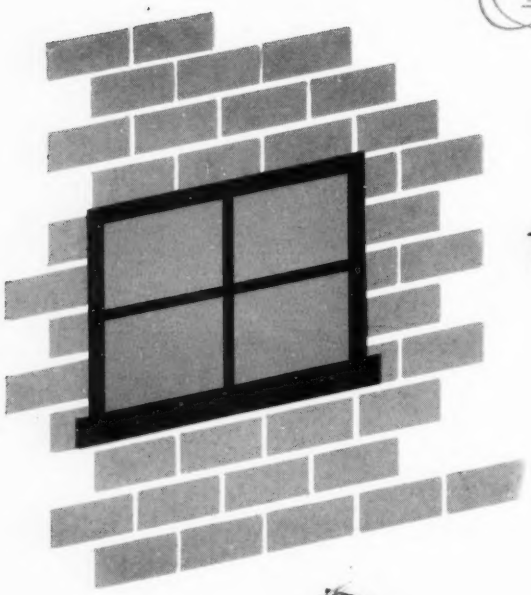
PEST CONTROL

FORMERLY PESTS AND THEIR CONTROL

Shopkeeper smiles because inspector says candy has no insect contamination. "How to Tell" begins on pg. 13

MAGAZINE OF THE PEST CONTROL
AND ALLIED SANITATION SERVICE INDUSTRIES

IN THE FALL a rodent's fancy turns to thoughts of indoor warmth



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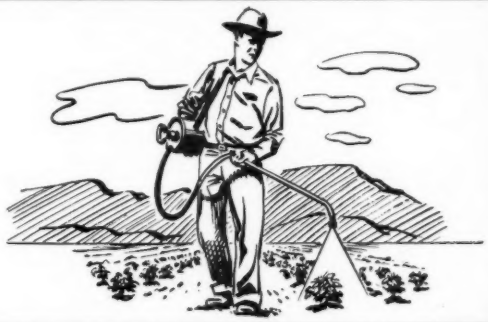

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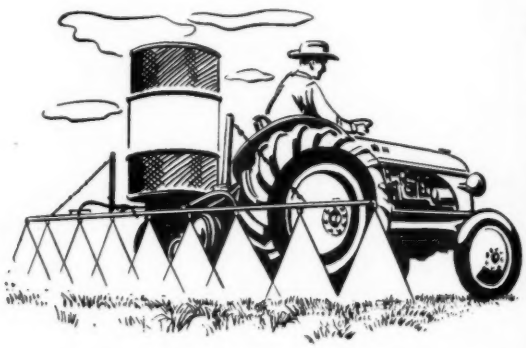

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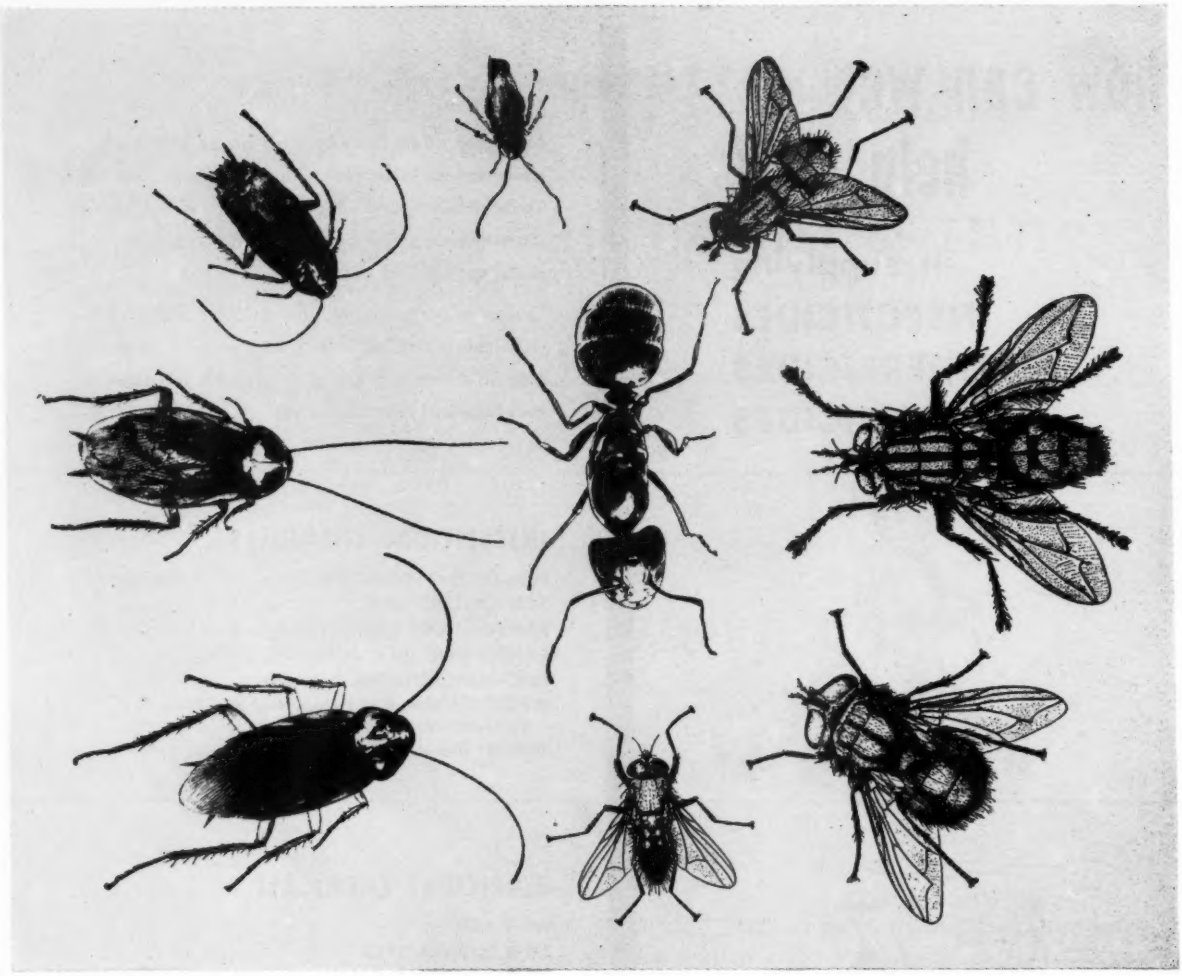

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Dr. Heal

News of Dr. Ralph Edward Heal's appointment to become the first Technical Director of the National Pest Control Association should bring renewed enthusiasm for the industry's progress. When he assumes his duties November 1st, pest control operators can look forward to a new era of Association service that has long been an NPCA dream.

Congratulations to the men who are responsible for picking Dr. Heal from the field of suitable men. He is well-qualified for the important position that will direct the industry's research program.

Broad-shouldered Dr. Heal stands 5 feet 7 inches tall, has a pleasing personality and a quiet, subtle sense of humor. His hobbies include hunting, hiking, dogs and woodworking. He belongs to the Adirondack Mountain Club. He will be "at home" with the men in this industry.

For the perplexing problems that confront him in this new undertaking, Dr. Heal is well-armed. His wide experience in experimental and practical pest control, coupled with a rare ability to analyze clearly are but a few of the qualities that fit him for this new position of leadership.

Delegates attending the current NPCA convention in California will meet Dr. Heal personally. Others will make his acquaintance as his takes on the traveling-counselor phase of the work. We join with pest control operators everywhere in wishing him the best of good fortune as he works to make a success of what will not be an easy job.

James A. Nelson

Editor

PEST CONTROL
FORMERLY PESTS AND THEIR CONTROL

JAMES A. NELSON
Editor

JOSEPH R. GROSS
Associate Editor

HENRY A. NELSON
West Coast Representative

OCTOBER, 1949 VOL. 17, No. 10

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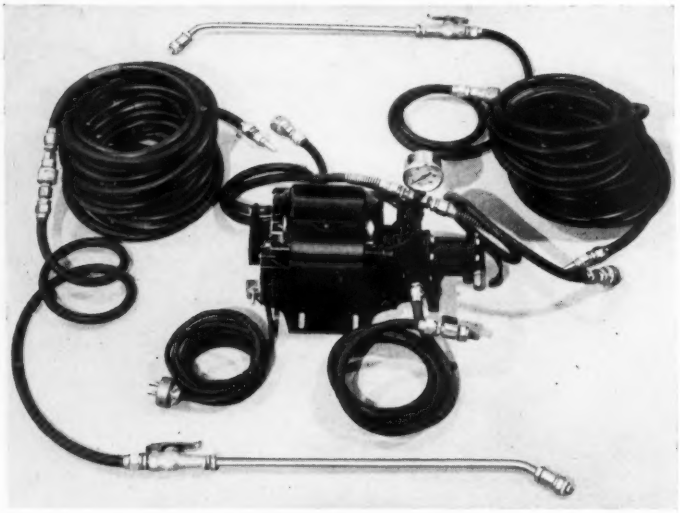

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LETTERS

School Board Confused

I know you are interested in improving our pest control industry so thought you would like to see the enclosed clipping taken from the August issue of Senco News. Maybe we can stop this kind of thing.

(Below is the clipping sent by reader M. D. Bloomfield, Just Exterminators, East Orange, N. J.)

"St. Louis, Mo., Aug. 4, 1949 — Uncertainly over which pests were meant by "elimination of pests from 30 St. Louis public schools" caused rejection of both bids for the work yesterday.

"Dr. Herbert O. Winterer member of the Board of Education finance committee, said the group felt two competing firms must not have agreed exactly on the meaning of "pests," so great was the discrepancy between the bids.

"Estimate of the school board for the work had been $6000. The low bid, $2004, was deemed too low. The high one, $17,020, also was thought extreme. The board plans to open the contracts to further bidding, after clarifying the meaning of "pests."

"The office of Building Commissioner, V. Harry Rhodes, stressed that "pests" is to be understood as an inclusive term, comprising "insects, rodents, vermin and termites."

Octalene, Octalox

There is, in the September issue of *Pest Control*, one rather serious inaccuracy in the report of the new names, Octalene and Octalox, for our Compounds 118 and 497. The account says, "both of these chemicals, now widely used in the United States," etc. This sentence should have read, "both of these chemicals, now widely used *experimentally* in the United States," etc. You will readily understand how the first statement may be miscontrued to our embarrassment, and we shall be grateful to you for making a correction in the next issue.

Edward Despres
Julius Hyman & Co.
Denver, Colorado

Our apologies for any embarrassment caused by the omission of an important word. It is one our proofreaders did not miss when checking over the galley-proofs.

Mole Control

Can you please tell us what chemicals are used to control moles?

American Fumigating Co., Inc.

Chemicals are usually not recommended for the control of moles since they eat animal matter and are very skeptical of anything foreign placed in their runways. The Fish and Wildlife Service recommends the use of traps. Two companies which manufacturer mole traps are: Animal Trap Co. of America, Lititz, Pa., and Michigan Wire Goods Co., Niles, Mich.

Sprayable Seal for Fumigating

In your August, 1949 issue on page 30, there is an article about a sprayable seal used in fumigating warehouses. An affiliate company of ours does considerable fumigation work but on many occasions considerable preliminary work must be done in preparing locales for Methyl Bromide fumigation. We are very much interested in the sprayable plastic commented upon and would appreciate advices as to this material and where its application equipment may be obtained.

C. A. Insecticides Mundiales
Caracas, Venezuela

All of the answers to your questions are fully explained in U. S. Department of Agriculture's Miscellaneous Publication No. 684, which is available from the Department in Washington, D. C. free of charge and should be obtained for a complete understanding of the procedure.

Briefly, the publication says, "The Department of Agriculture, in its study of sealing tobacco warehouses, was anxious to find a material which would retain its elastic and adhesive qualities over long periods of time. Plastic materials were considered and were found to have these characteristics, and, in addition, were readily removable (strippable). Vinylite plastic strippable film is a material the basis of which is a plasticized vinyl chloride-acetate copolymer resin. It is made sprayable for pressure spray-gun equipment by the addition of volatile solvents, such as methyl ethyl ketone and acetone. The resulting material after the volatile solvents have evaporated, forms a durable, flexible film which is tough and weather resistant. In addition to being volatile, the solvents used in plastic are highly inflammable and explosive where a sufficient concentration of fumes exist.

". . . Sharp instruments or nails puncture it easily and for this reason plastic should not be used in sealing the floor of a building unless the work can be done from the lower side . . .

". . . Vinylite plastic film is a viscous liquid which comes from the manufacturer in sprayable form ready to use. It is shipped in metal containers, or drums . . ." The manufacturers of the basic vinylite plastic film, who are authorized suppliers of formula OS-3602 to the Navy, which made some of the tests, are as follows, (given also are the trade names of the products similar to OS-3602): R. M. Hollingshead Corp., 840 Cooper St., Camden, N. J. "Cocoon"; Better Finishes & Coatings, Inc., 268 Doremus Ave., Newark 5, N. J., "Liquid Envelope"; Zapon Division, Atlas Powder Co., Stamford, Conn., "Brevon"; and Stoner-Mudge, Inc., 200 Westhall St., Pittsburgh 12, Pa., "Strippable Coating."

Equipment for the application of plastic material is basically that used for spraying paint and other viscous substances. Manufacturers of equipment listed by the Navy in their publication OS-3602 on this subject are the DeVilbiss Co., Toledo, Ohio and Binks Manufacturing Co., Chicago, Ill.

Complete information as to costs, methods of application, etc. can be obtained from the USDA miscellaneous publication 684, "Plastic Sealing of Tobacco Storage Warehouses."

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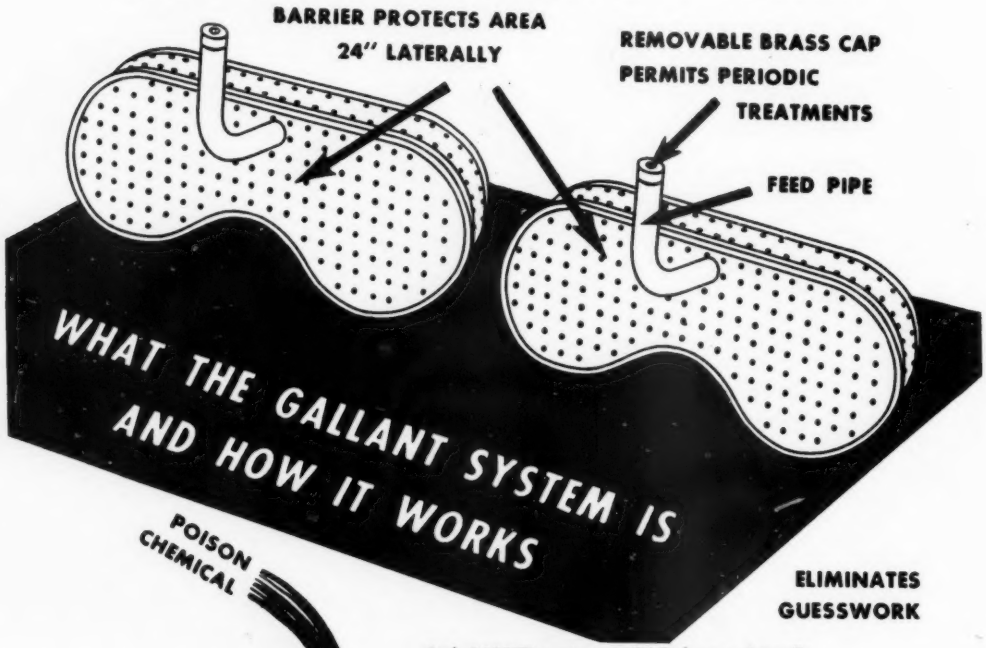

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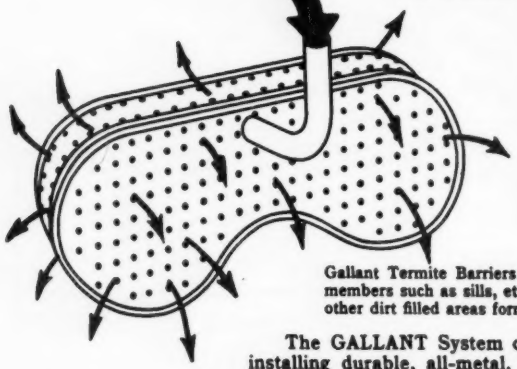

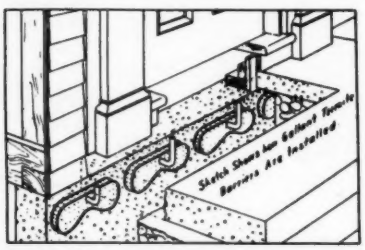

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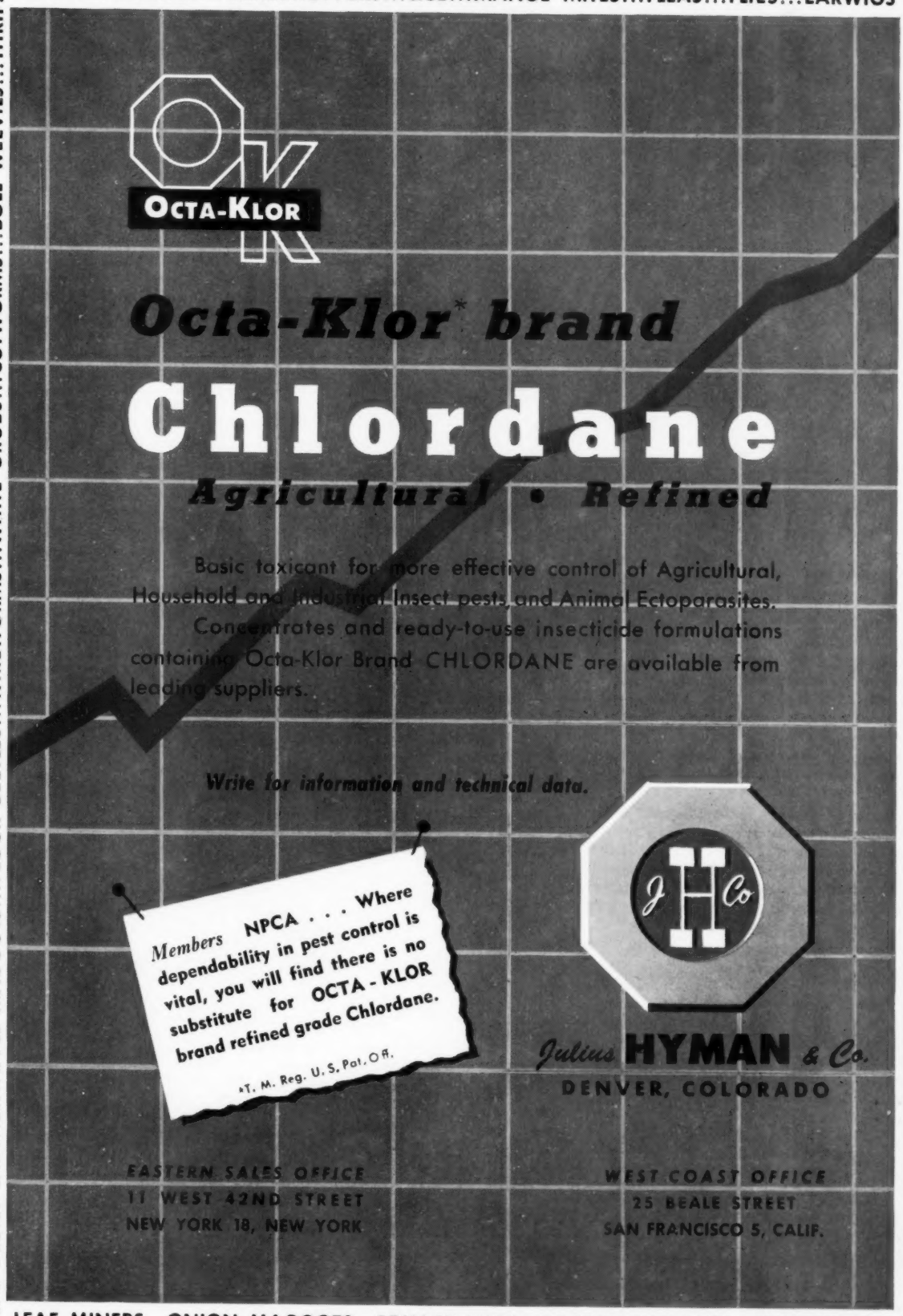
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Sources of *Insect and Rodent Contamination* in Food Processing Industries[1]

Figure 1. Feeding marks on a candy bar — typical signs of rodent infestation.

BY ROBERT J. DICKE

Assistant Professor, Department of Economic Entomology
The University of Wisconsin

THE ADULTERATION of foods by "filth" contaminants in the confectionary and other processing industries is a serious sanitation problem. Extraneous matter such as rodent hairs and insect fragments are primary indications of "filthy" or insanitary manufacturing procedures.[2] Products so contaminated or adulterated are subject to seizure and condemnation by regulatory agencies. Manufacturers of adulterated foods are usually subject to considerable adverse publicity and, with repeated offenses, to fines and imprisonment or both. Although food manufacturers generally are aware of and practice routine plant sanitation, food contamination may be difficult to avoid and sources of contaminants are not readily appreciated or are unknown. The elimination of active insect and rodent infestations is of primary consideration and is the most obvious means of filth control. However, filth contamination of foods may continue long after the implementation of satisfactory sanitary and pest control procedures.

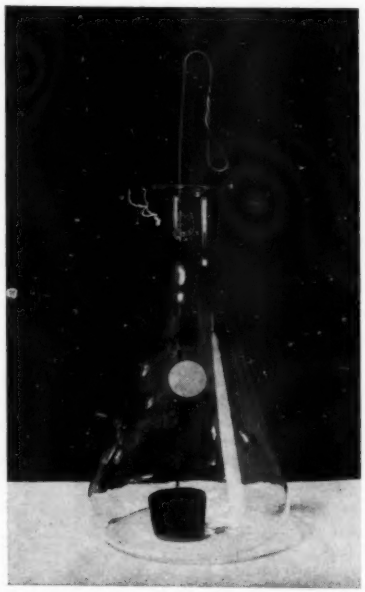

Figure 2. Wildman Trap Flask used for the separation of filth contaminants from insoluble food products by the gasoline flotation method. The gasoline fraction (containing insect fragments and rodent hairs) is collected in the neck of the flask. This fraction is readily separated from the aqueous mixture by elevating the rubber stopper up to the neck of the flask and by pouring off the gasoline layer above the stopper.

The sources of insect and rodent contamination of confectionary products were studied for several years at the University of Wisconsin. The results of these studies are reported as an aid to pest control operators and food processors for the prevention and control of filth contamination.

Methods of Examination

Food Products. Sampling of foods for filth contamination included raw materials and processed products in all stages of manufacture. Incoming shipments of raw materials were examined for initial contamination during manufacture or shipment. Broken or damaged cartons were given special attention. Routine examinations of wrapped, finished products taken at random from shipping cartons were made at weekly intervals. Where filth adulteration of finished products was indicated, samples of the product in all stages of development were taken from the production line and examined to determine the probable source of contamination.

Gross inspections of foods were used to reveal indications of insect infestations and rodent feeding. Powdered or granulated products such and flour, starch, and sugar were sieved to isolate living insects in all stages of development, caste skins and faeces. On solid foods, common signs of insect infestation were webbing and frass, and the fraying of cartons and bags, pellets or faeces and teeth marks were common signs of rodent feeding (Fig. 1). For liquid foods, gross contaminants were readily isolated by filtration of the surface scum, residues, or sediment.

In addition to gross examinations, all extraneous matter isolated from food products were examined microscopically for such indications of filth contamination as insect fragments, rodent hairs,

1. Approved by the Director of the Wisconsin Agricultural Experiment Station.
2. *Food, Drug and Cosmetic Act of 1938*, Sec. 402. "A food shall be deemed to be adulterated — (a) — (3), if it consists in whole or in part of any filthy, putrid, or decomposed substance — or, (4) if it has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health —."

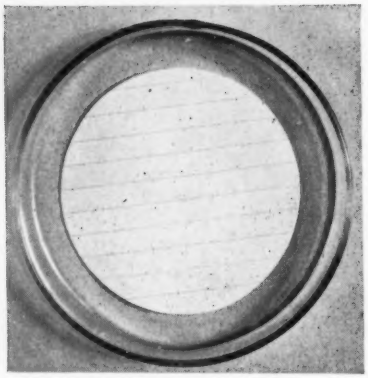

Figure 3. A ruled filter paper retaining minute particles of extraneous matter placed in a Petri dish and prepared for microscopic examination.

finger nail polish, human hair, etc. Soluble foods were macerated, digested and/or dissolved, and filtered in a Buchner suction funnel. Where the food consisted of large quantities of insoluble materials such as peanuts, cereals, gums, etc., a gasoline flotation method was used. Macerated residues and/or washings of insoluble products were mixed with hot water and placed in a two liter Wildman trap flask (Fig. 2). Gasoline in 30 cc portions was added, and the whole mixed gently but thoroughly. The flask was then completely filled with water permitting the gasoline layer to rise into the neck of the flask. Insect fragments and rodent hairs contacted by gasoline during the mixing process readily floated to the surface and remained in the gasoline layer. A stopper-device permitted trapping-off of the gasoline layer which was then filtered. A coarse filter paper 7 cm. in diameter was used. This paper was ruled in parallel lines 7 mm. apart to facilitate examination under the low power of a stereoscopic microscope. Papers retaining extraneous matter were placed in Petri dishes for examination (Fig. 3). A drop of mineral oil placed in the center of the dish prior to transfer of the material to be examined served to clear the paper and hold it tightly and smoothly to the glass surface.[3]

Physical Plant. General sanitary inspections of the physical plant during the day and after daily operation were made at monthly intervals. Inspections during the day reveal the sanitation faults of normal operation, while night inspections are of equal importance as a check on the degree of nocturnal pest infestations and on the general maintenance of equipment and precautions employed to prevent contamination. These investigations were always made without previous appointment.

All probable resting or breeding sites of insects such as cracks of floors and beams, dark and humid recesses, under machines and conveyor belts, behind sinks, etc. were probed for evidences of living insects. Gross observations included a search for insect and rodent faeces (the latter confirmed by presence of hairs), insect webbing and frass, feeding marks on food products, and apparent accumulations of dead insects and cast skins.

Samples of dust and debris for microscopic examination were taken throughout the plant for indications of residual filth accumulations. These samples included lint and other debris from cracks in floors, walls, etc., from under conveyor belts, machines, and behind all permanently installed equipment and from floor sweepings and vacuum cleaners. Where greasy surfaces were sampled, these were scraped with a knife and the scrapings trapped-off with gasoline flotation and filtered. All other flat surfaces such as table tops, processing machines and overhead beams were sampled by wiping with cheese cloth swabs. Prior to sampling, these swabs were slightly moistened with mineral oil to insure the adherance of lint. Individual swabs were contained in Petri dishes to avoid contamination of samples. The swabs were then examined under a stereoscopic microscope for filth accumulations.

Sources of contamination other than from raw produce adulteration or plant infestations should be considered in the general plant inspection. For example, paper cartons and wrappers may become contaminated with insect fragments during their manufacture or storage (Fig. 4). The dress and general cleanliness of plant personnel is of important consideration. These observations during and after plant operation should include the activities of general laborers and repairmen as well as those employed on the production line.

Microscopic Evidences Of Filth Contamination

Considerable extraneous matter may be isolated from food products and readily identified upon microscopic examination. Such materials as wood splinters and other plant fibers (Fig. 5), granules of sand (Fig. 6), metal shearings and paint chips are frequently encountered. Fiber bristles from brushes and lint (including jute, cotton and wool fibers, Figs. 7 and 8) are readily identified and distinguished from animal hairs. Unless these contaminants appear in appreciable and macroscopic quantities or can be definitely as-

3. Methods of food analysis and identification of filth contamination are more completely described in the following publications: *Microanalysis of Food and Drug Products*, Food and Drug Circular No. 1, 171 pp., 1944; and *Methods of Analysis*, Assoc. Official Agric. Chem. 6th Ed. pp. 66-801, 1945.

IDENTIFICATION OF MAGNIFIED PICTURES

Figure 4. Crushed body of a blow fly on the surface of an ice cream carton (10x). Filth contamination may result from faulty manufacture of food containers.

Figure 5. Wood splinters and fibres are readily recognized. (10x).

Figure 6. Granules of sand are frequently encountered in food products (10x).

Figure 7. Cotton fibers are distinguished from other "hair-like" fibers by their twisted, irregular margins (220x).

Figure 8. The scaly surface and margins of wool fibers readily distinguish them from human hair (220x).

Figure 9. A smooth shaft of blond human hair without a medulla and with little pigmentation in the cortex (220x).

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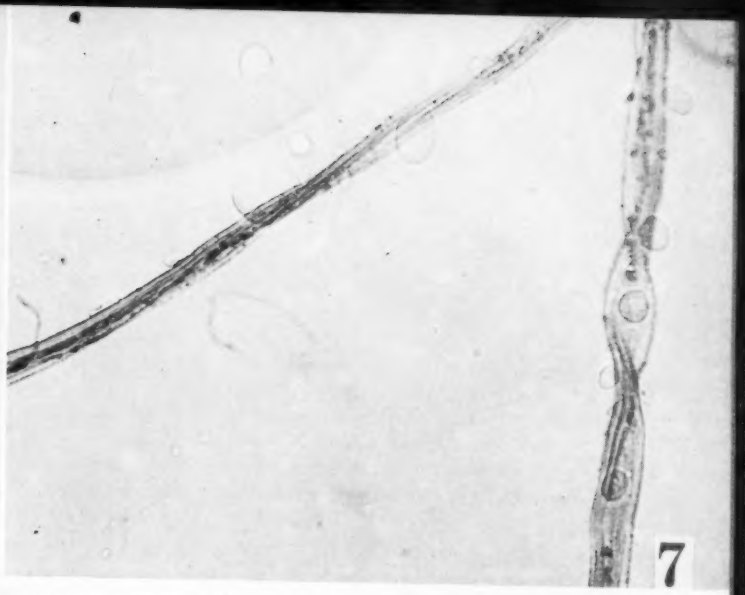

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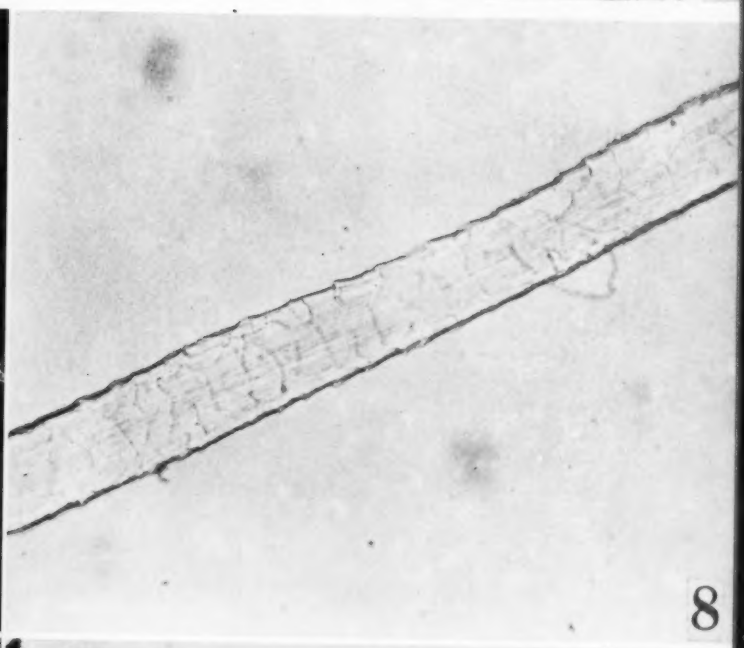

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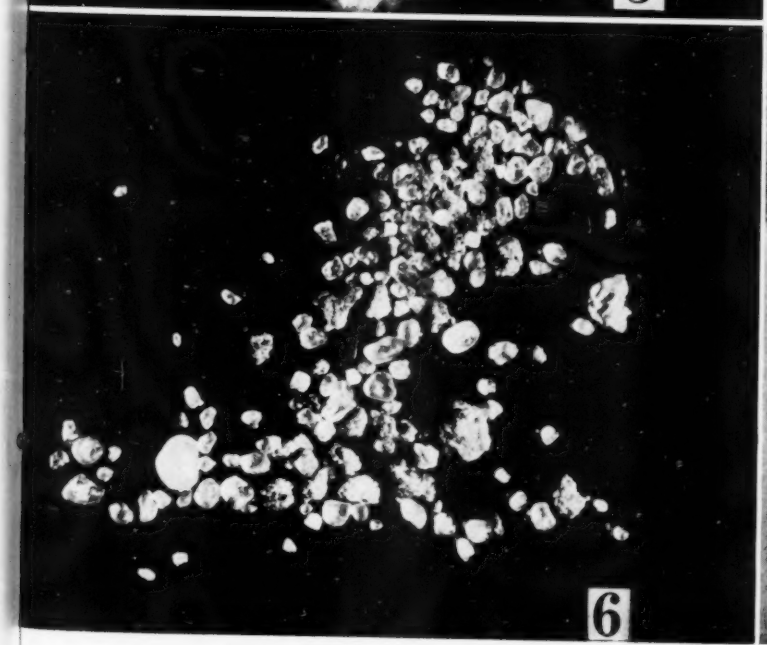

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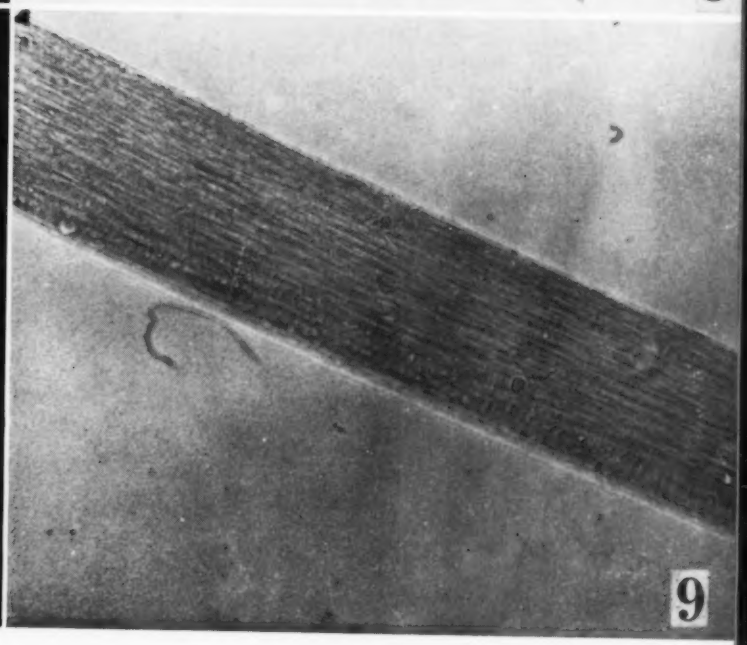

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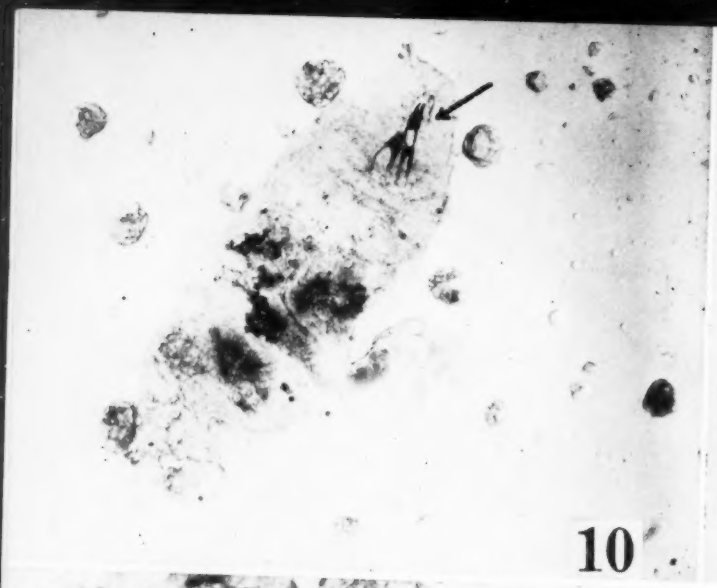

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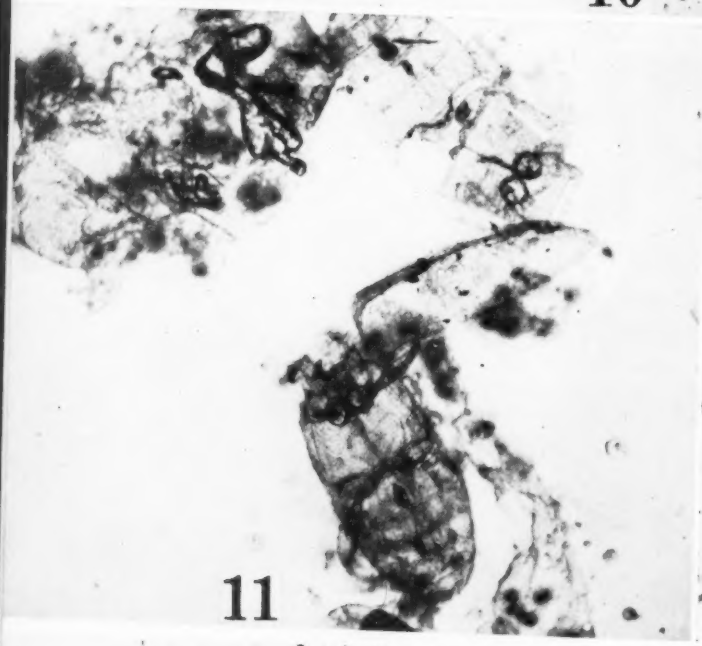

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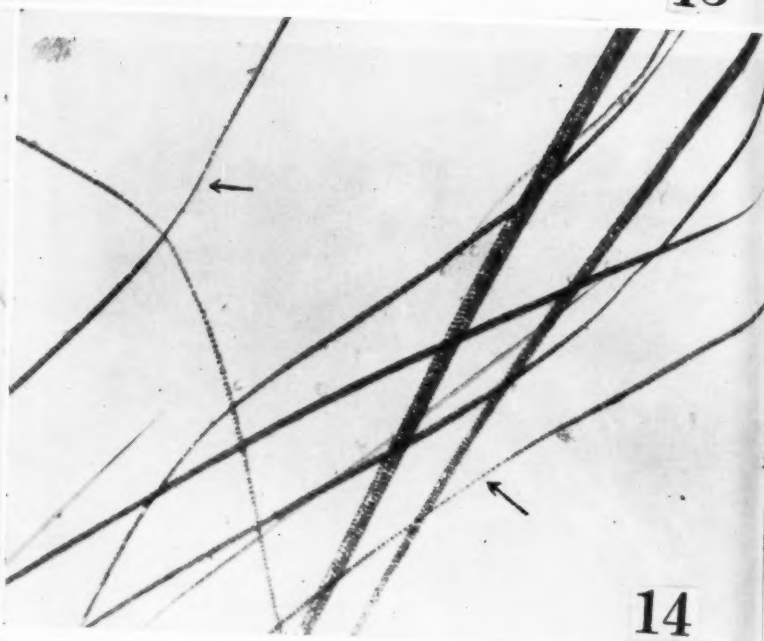

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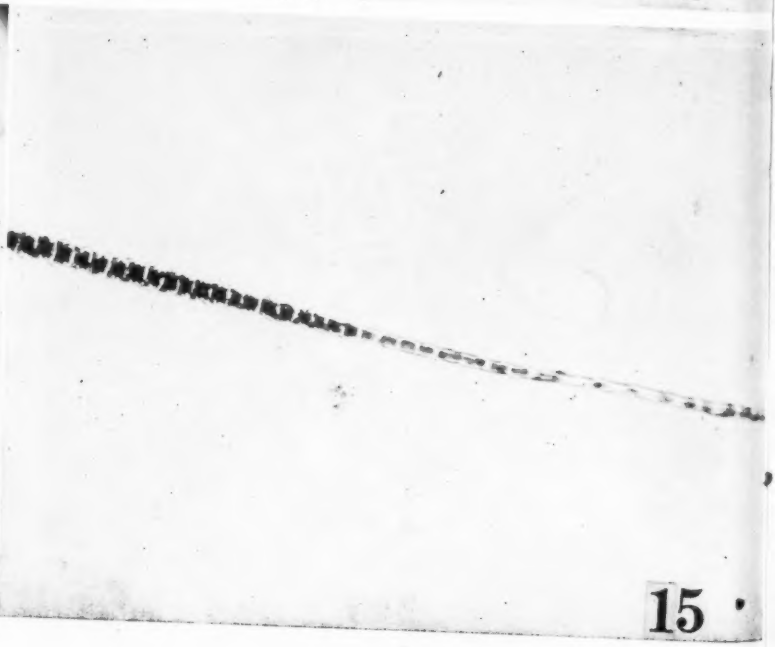

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sociated with insanitary conditions, they are not usually considered filth adulteration. Insanitary conditions of handling are indicated however when human hair (Fig. 9), chips of finger nail polish, or any article associated with the habiliment of employees are recovered from food products.

Insect fragments and rodent hairs are considered primary indications of insanitary manufacturing procedures. The fragments of insects in general are readily recognized under a stereoscopic microscope at magnifications ranging from 15 to 30 diameters. These contaminants may range in size from whole larvae or mature insects (Figs. 10 and 11) to fragments of wings and other appendages, segments of the integument and setae (Figs. 12 and 13). Although insect fragments are readily distinguished from such materials as plant tissue and hairs, the identification of insect species by these fragments may be difficult or impossible. The fragments of a harmless midge, for example, may be readily confused with those of a typical "filth" insect such as the common house fly. An interpretation of filth adulteration by insect fragments may also vary widely with the class of food under consideration, e.g. canned fruits and vegetables as compared with bakery or confectionary products. However, where most processed foods are concerned, insect fragments should be considered primary filth contaminants by the inspector.

Rodent hairs are an especially serious indicator of filth contamination for all food products. These are readily distinguished at low magnification from other hairs commonly encountered in food products (Figs. 14 and 15). In general, a rodent source is evident wherever prominent constrictions or internodes occur along the length of the hair. Where other mammals than rats or mice may be the source of contamination (i.e. cat hairs, which are readily confused with rodent hairs) special techniques and microscopic magnifications ranging from 400-500 diameters may be necessary.[4]

Sources of Filth Contamination

ACTIVE insect and rodent infestations. Active infestations of insects and rodents in food processing plants are the most obvious source of contamination. Every effort of course should be made by manufacturers and pest control operators to eliminate or at least bring under reasonable control all established insect and rodent infestations. It is interesting to note however that established infestations of such domestic pests as roaches and silverfish and such stored product insects as dermestid beetles, grain beetles and moths were not the principal source of contamination in a confectionary industry studied over a period of two years. Of 158 finished candy samples (comprising four 1-2 oz. candy bars per sample) analyzed during this period, a total of 34 were contaminated with insect fragments. Only three of these contaminations were definitely associated with established insect infestations.

The accidental invasion of such insects as midges, bees, wasps, flies and ants was a more serious source of food contamination than were active infestations of roaches and stored product insects. Most of the insect fragments recovered were associated with accidental invasion of such dipterous insects as midges and flies. The breeding site for these insects was observed to be considerably removed from the immediate premises of the confectionary plant.

Factory Personnel. The faulty habiliment of employees are occasional sources of food contamination. Hair nets should be required for women employees, and nail polish should be removed before handling food materials. A standard clean uniform maintained by the company and required of all food handlers not only encourages individual habits of cleanliness but prevents certain articles of clothing from falling into food products. The activities of employees other than food handlers such as janitors and repairmen should be strictly regulated. These classes of laborers usually are not required to observe sanitary principals, and food products and processing equipment may be readily contaminated during the repair of machinery and utilities or during general maintenance of the physical plant.

Raw Products. Food materials employed in the manufacture of processed products are occasional primary sources of insect fragments or rodent hairs. Such contamination may readily occur during the manufacture, storage and shipment of raw products. Inspections of raw products, including microscopic examination, should be made at frequent intervals. These products however, for the confectionary industry studied, were not a principal source of contamination. Of 53 raw products examined, insect fragments were recovered from seven samples and rodent hairs from two samples. Whether the samples containing

IDENTIFICATION OF MAGNIFIED PARTICLES

Figure 10. A fly maggot recovered from candied fruit. The black skeletal structure or "mouth hooks" are characteristic of dipterous larvae (25x).

Figure 11. These grain beetles were recovered from a confectionary product in which contaminated cereals were used (25x).

Figure 12. Wing fragments of the common house fly (25x).

Figure 13. Body fragment of a dipterous insect with typical setae. These fragments are difficult to identify and may be readily confused with such filth insects as the common house fly (30x).

Figure 14. Hairs of a mouse demonstrating discontinuous pigmentation of medulla (70x). When a marked constriction or internode in the diameter of the shaft (indicated by arrow) occurs, a rodent hair may be readily distinguished from other similar mammalian hairs.

Figure 15. A rodent hair recovered from a confectionary product (220x). Note the reduction in medulla pigmentation at the internode.

4. H. A. Mathiak, *A Key to Hairs of the Mammals of Southern Michigan*, Jour. Wildlife Management, 2 (4): 251-268, 1938.

rodent hairs were primary sources of contamination was questionable since the containers in which they were stored remained uncovered for long periods of time. Contamination of foods in open containers may readily occur within the plant. Cereal and fruit products appeared to be most subject to insect contamination.

Where imperfections of finished products occur in relation to shape. weight, faulty chocolate coverage, etc., they are rejected but are usually stored temporarily for reprocessing. Observations indicated that these rejects were generally stored and handled in an insanitary manner. Confections reprocessed from rejects, for example, were more frequently contaminated than first line products.

Residual Accumulations of Rodent Hairs and Insect Fragments. Accumulations of fragments and hairs in lint and other debris throughout the processing plant are a principal source of food contamination. These accumulations may occur in cracks and crevices, on overhead beams or behind fixed equipment where they are inaccessible to ordinary cleaning procedures. Temporarily fixed deposits are continuously freed by strong air currents and machine agitation. Minute fur hairs and dry, fractured segments of insects may fall directly into food products or may be carried by air currents onto surfaces where foods are processed.

During the initial phases of this investigation, studies soon indicated that established infestations of domestic pests were not the principal source of filth contaminants. Food contamination continued without abatement long after rodent and cockroach infestations were brought under reasonable control. Swab samples of dust and lint demonstrated accumulation of filth contaminants on overhead beams directly above open vats or machines, table tops and conveyor belts. When these accumulations were removed by thorough vacuum cleaning of all surfaces, contamination of finished products ceased almost immediately.

During the first two months of the study after insect and rodent pests were brought under control, 30% of the finished product samples were contaminated with one or more rodent hairs. Immediately following and for a continuous period of 11 months after a thorough vacuum cleaning of the entire plant, no rodent hairs were encountered in finished products. During this period, sporadic reinfestations of rats and mice occurred, although contamination apparently was prevented by a rigid sanitation program. At a later date when general plant sanitation was relaxed, rodent contamination again occurred although at this particular time no rodent infestations were evident. These observations in general were applicable for sources of insect contamination as well. Midge fragments for example were demonstrated by swab samples to occur throughout the plant for long periods after initial invasion. In one instance, during a period when general sanitation was relaxed, midge fragments were recovered from a candy product six months after a killing frost had terminated the flights of these insects.

Accumulations of filth contaminants obviously originate from initial rodent and insect infestations. It appears from this study however that relatively few contaminations occur through the physical contact of domestic pests, but that residues of filth from such infestations are the principal source. These accumulations may have occurred during a period considerably remote from the time of a particular food contamination. This observation is of considerable importance where buildings previously occupied by other industries where insect and rodent infestations were tolerated are renovated for use by a food processing industry. Observations during this study demonstrated that adequate facilities and personnel must be provided for persistent and routine removal of dust accumulations throughout the plant and that raw and finished food products should be adequately covered or otherwise protected except when in immediate use. Such preventative measures must be in force irrespective of adequate pest control.

Conclusions

The prevention of filth adulteration in the food processing industry is becoming an increasingly important problem for food manufacturers and pest control operators. Relatively simple methods of inspection and analysis are available however for the evaluation of filth contamination and for the determination of contamination sources. Several sources of contamination were observed during a two year study of a confectionary industry. Of these probable sources, residual accumulations of filth contaminants were considered of primary importance. These studies further demonstrated (1) that the control of filth contamination does not end with the pest control operator through eradication of insect and rodent infestations, and (2) that the strict implementation of simple sanitation practices by food manufacturers appears to be of equal importance with adequate pest control.

Name Mite Family For Pomerantz

Dr. Edward W. Baker, Acarologist, Division of Insect Identification, U. S. Bureau of Entomology & Plant Quarantine, USDA, recently published an article in the *Journal of the Washington Academy of Sciences*, entitled, "Pomerantziidae — New Family of Prostigmatic Mites." This mite is named for Charles Pomerantz, of Bell Exterminating Co., New York city, in recognition of his enthusiastic services to the study of rickettsialpox disease, which is carried to man by *Allodermanyssus Sanguineus* (Hirst), a mite parasite of mice.

Most Insects Not Pests

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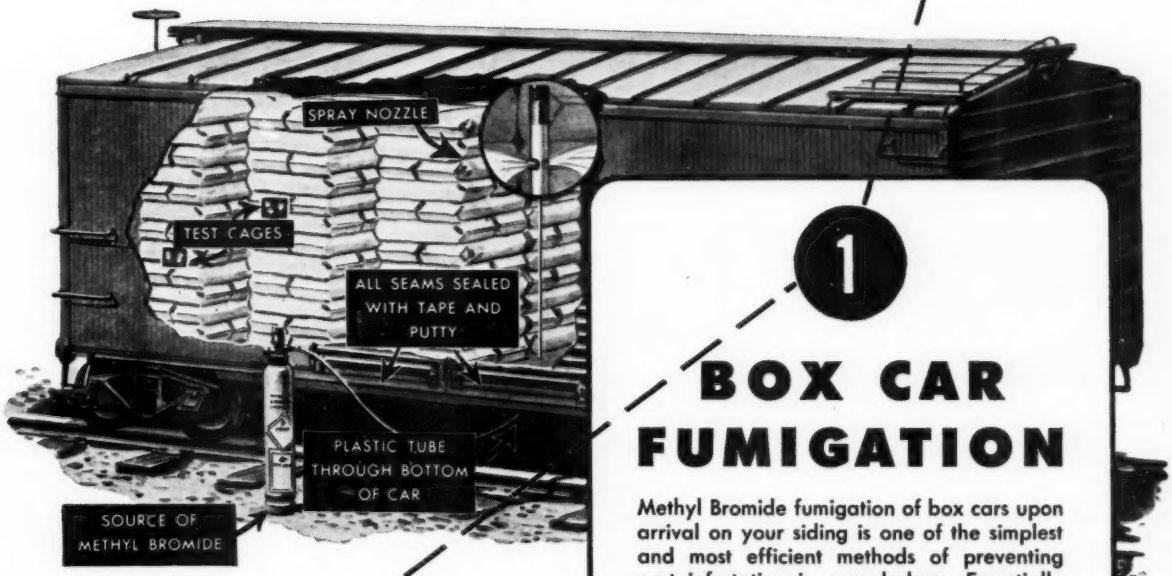
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TEST CAGES
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1. Car is sealed tightly with masking tape and putty to prevent leakage of Methyl Bromide.
2. Saran tube is pushed through small hole drilled through bottom of car opposite door and attached near top of car.
3. "Test cages" are placed in low sections of the car to test efficiency of the fumigation job.
4. Tube is connected to Methyl Bromide cylinder and valve opened.
5. After fumigation, tube is withdrawn and hole plugged with dowel pin.
6. Dosages are figured on the basis of total box car capacity, possibility of leakage, and the temperature inside the car.

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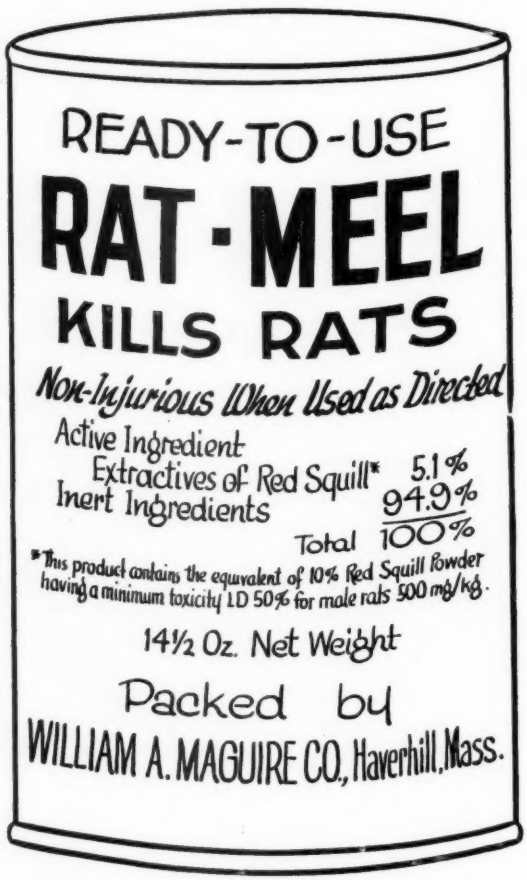
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In Part One, which appears in the September issue of PEST CONTROL, H. A. U. Monro gave the basis for a discussion of the resistance problem. Included was a discussion of the terms "Resistance," "Mutation," and "Individual Adaptation." Also covered were the mechanics of resistance to chemicals, and how resistant populations might develop. Part Two completes this article, one of the finest studies available on the subject. Reprints of the entire article, including both Parts One and Two, will be available upon receipt of 25c in cash or stamps.

IN TWO PARTS:

Part Two

INSECT RESISTANCE TO INSECTICIDES

by H. A. U. MONRO

Officer-in-charge, Fumigation Laboratory
Dominion Department of Agriculture, Montreal, Quebec, Canada

Previous Records of Resistance

WE SHOULD NOW be in a position to apply the considerations brought out in the foregoing discussion to recorded accounts of the development of insect resistance to insecticide in the field.

Scale Insects in California: Scale insects belong to groups in the family Coccidae of the order Homoptera. Familiar examples are the oystershell and San Jose scales, which are found on a wide variety of trees, including fruit trees. Several species of this family are of great economic importance as pests of fruit in California, and, owing to the concentration of very valuable fruit-growing areas in the region, they have been subjected to chemical control methods and intensive study by entomologists for a long period.

Of the four scale insects which have given evidence of increasing resistance to insecticides in California, we may profitably review the history of one, the California red scale, *Aonidiella aurantii* (Mask.), a pest of citrus trees whose powers of resistance have been observed closely by entomologists and geneticists. From 1886 to about 1914, hydrocyanic acid gas (HCN) fumigation of the trees under tents proved a very satisfactory method of control over the whole range of this insect in California. In 1916, Quayle reported the appearance of a resistance to the fumigation in a restricted area at Corona, California.

The differences in concentrations of HCN required to kill the resistant and non-resistant strains were studied very extensively in the laboratory for a number of years. (It may be mentioned at this point that study of comparative resistance to fumigants of different strains of the same insect lends itself very well to laboratory procedures, for it is possible to expose both strains simultaneously to the same dosage and set of conditions in the same fumigation chamber.) The resistant and non-resistant strains were maintained in the laboratory for a large number of generations, and continued to show significant differences in resistance, thus demonstrating that local differences in climate, soil, and other natural environmental factors had no significant bearing on the original observation. Furthermore, Dickson (1941) was able to carry out a series of cross-breeding trials, and he exposed the progeny to a number of identical fumigation with HCN. These tests revealed that intermediate degrees of resistance existed in the offspring of matings between resistant and non-resistant strains. In the second generation of these hybrids, a segregation took place which showed that the two strains differed by a single sex-linked gene. This shows that the two original strains differed in the hereditary determiners which they carried. As mentioned previously, this is the desirable type of analysis which should be applied to all cases of presumed development of resistance to insecticides.

The further history of this problem is to be found in the field, and has an important bearing on our whole subject. Despite the subsequent appearance of resistant populations in a number of different areas throughout the citrus-growing districts of California, and even after a further lapse of time after the original discovery in 1916, in large areas the non-resistant strains were still present. Fumigation with HCN was still being carried out at intervals of two or three years, as opposed to the necessity of an annual or semi-annual fumigation in the resistant areas. Moreover, although fumigation of this insect actually began in California in the San Gabriel Valley, in 1943 no resistant strain had been reported there.

It is not possible in this review to give a detailed account of the resistance demonstrated by the three other species of scales in California, but one common feature should be indicated. In all cases resistance was not reported as widespread over the whole range of the species in the fruit-growing areas, but was localized to varying degrees in the case of each species of insect. Another important feature, from the viewpoint of this discussion, is that the females live most of their life in a stationary situation, fixed to the host. Although the newly hatched nymphs or "crawlers" are capable of traveling some distance before settling down, the general effect of this type of life-cycle is to curtail active movements of the insects themselves from one locality to another.

The codling moth: The codling moth, *Carpocapsa pomonella*, (L.) a common insect of great econ-

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ISOTOX kills faster: 1. HOUSE FLIES (including DDT-resistant strain). 2. ROACHES. 3. CARPET BEETLES. 4. BEDBUGS. 5. ANTS; and many others.

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omic importance to the fruit-growing industry, has been subjected to intensive control practices for a great number of years. In contrast to the scale insects, female codling moths are active fliers and are theoretically capable of traveling considerable distances or of being carried by wind, from one orchard to another in order to lay their eggs.

Until the introduction of DDT the standard control measure for most of this time had been the application of some arsenic compound, chiefly lead arsenate. Resistance of the insect to arsenicals was manifested by a progressive increase in the number of spray applications required to control. For instance, in 1930, four sprays were required in Virginia and 8, 10 or 12 in Grand Valley, Colorado. In 1928, Hough published the first of a number of reports dealing with his studies on the difference in the resistance of insects from these two areas, with the addition of a strain from the state of Washington, from a district where the number of sprays recommended in the field was intermediate between those used in Virginia and Colorado. In the laboratory, this range of resistance according to locality was confirmed by the relative ability of the young larvae to enter apples, sprayed not only with lead arsenate but also with a number of other poisons. Here again, in extensive cross breeding studies, it was found possible to produce progeny intermediate in resistance to the parental strains and, also, segregation in the second-generation hybrids. Another important study, also, revealed that a resistant population could be bred from the Virginia strains by successive selection of survivors. Again, this immediately raised the important question as to why such resistant strains had not appeared in the field.

The explanation given by Hough was that although the resistant strains were superior in their ability to overcome the spray treatments, and in some other repects as well, they did not possess the ability to breed so rapidly as the less resistant ones. As Smith (1941) points out, the "Colorado race must have some weakness as compared to the Virginia race; otherwise it should have become dominant everywhere."

The peach twig borer in California: Resistance to basic lead arsenate developed by the peach twig borer in a very restricted area in central California has recently been reported by Summers (1949). This insect has successfully been controlled throughout California by the application of two lead arsenate sprays, but in 1944 the population of the insect increased very rapidly in peach orchard near Empire, Stanislaus County. Increased use of the chemical with additional sprays or dustings up to five applications was not wholly successful in bringing about adequate control. Laboratory tests showed significant differences between a population of Empire larvae and one from another part of the state, where resistance had not occurred, in the ability of larvae to become established on peaches dipped in suspensions of lead arsenate.

This new occurence of resistance is of special interest in view of the fact that resistance has occurred in a very small part of a large area of infestation, suggesting the possibility that in this case a definite mutation may have occurred. It is to be hoped that this study will be followed up both in the field and the laboratory, as further information based on a genetic analysis would throw more light on this whole problem.

Aspects For Thought And Investigation

THIS BRIEF REVIEW will have achieved its purpose if it has prompted in the reader a critical attitude towards either the whole question of insect resistance, or towards any isolated reports of resistance which are brought to his attention. While it is quite possible to produce extreme degrees of resistance in the laboratory, it must not be assumed that such conditions are likely to occur in the field. The conditions of localized reports of resistance should be examined very critically in relation to the situation in adjoining districts, or throughout the country as a whole. However, this discussion, dealing as it does with a biological problem, has not only left many questions unanswered but has inevitably raised new ones, a few of which are enumerated herewith:

1. *Levels of resistance*: It is important to point out that in accordance with modern genetic theory it is impossible for the population as a whole to develop a degree of intrinsic resistance higher than that exhibited by the most resistant insect in it, unless a mutation or regrouping of the genes has occurred. This fact was demonstrated in the case of the California red scale (Dickson, 1941), when the resistant strain was found to require a certain increased dose to bring about a satisfactory mortality, which larger dose when applied, continued to give the required results against this strain. If, subsequently, a higher dose is found to be required to deal with the insect, then is indication that either a mutation or, otherwise, altered genetic factors have appeared. These considerations should be borne in mind in the subsequent discussions, especially those dealing with intensity of application.

2. *Rarity of recorded instances*: Though a great deal of attention has been given to the problem of resistance, we are inclined to forget the converse namely, non-resistance of susceptibility. Quayle (1943) cites seven well authenticated cases of resistance, supported by experimental evidence, which number includes five of the six mentioned in this article. This is a very small figure compared with the possibilities present in the fact that many different species of insects are being treated with a number of different insecticides. It is possible that some degree of resistance may have developed in all these insects but that it has not reached the stage where it has become manifest under the conditions and at the dosage of the chemical commonly applied.

To take one possible instance, since the introduction of DDT the bedbug has been subjected to this chemical on a large scale for five or more years under conditions

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which, it seems, might lead to the development of resistance. However, the general impression remains that the bedbug is quite susceptible to DDT and, at the time of writing, no noticeable resistance has been reported. Are we to assume that this is so, or may we expect the appearance of resistance some time in the future? It is obviously the duty of entomologists engaged in the study of insecticides, aided by geneticists, to attempt to anticipate, in the laboratory, the possible course of the phenomenon in the field, especially with regard to the more important economic insects.

A case of failure to develop resistance to climatic conditions is found in the study of Bucher, Cameron and Wilkes (1948) on the puparia of the housefly, already mentioned.

3. *Interval before appearance of resistance*: The history of the red scale in California shows that although fumigation began in 1886 observations of a significant amount of resistance were not made until 1914, an interval of 28 years. This insect is stated by Essig (1929) to have four generations a year in California. If the housefly has actually developed a significant resistance to DDT, it has only taken 4 or 5 years to do so, since the first intensive applications of D D T against houseflies began in 1945. The housefly has 6 to 10 generations a year throughout most of the United States and Canada. In other words, in the scale insect resistance developed after about 112 generations, in the housefly after 25 to 50 generations. Analysis of the history of resistance in other insects would doubtless reveal wide variations in these intervals.

Appearance of resistance after the introduction of a given insecticide must obviously depend on a number of factors, including:

(a) Population size;
(b) The relative proportion of the resistant strain or strains, if any, in the original population;
(c) The number of generations per annum;
(d) The intensity of application of the insecticide;
(e) The comparative isolation of the population;
(f) The mutation rate and the number of genetic factors involved.

It also seems reasonable to suggest that the rapid appearance of resistance over a wide area would indicate the existence of a definite proportion of resistant individuals in the population before the introduction of the chemical, for if one or more mutations did subsequently occur, they would take longer to manifest themselves throughout the whole area of distribution of the insect.

4. *Loss of resistance*: Some important lessons could be learned under field conditions in the case of removal of the insecticide and the substitution of a new one, after resistance has been observed. An instance would be the case of the gladiolus thrips *Taeniothrips simplex* (Mor.), which was reported by Quayle (1943) to have developed resistance to the tartar emetic-sucrose spray. DDT has now been widely adopted as a control for this insect, and a valuable experiment could be conducted by using the former mixture, after an interval of years, in the same areas where resistance was originally reported.

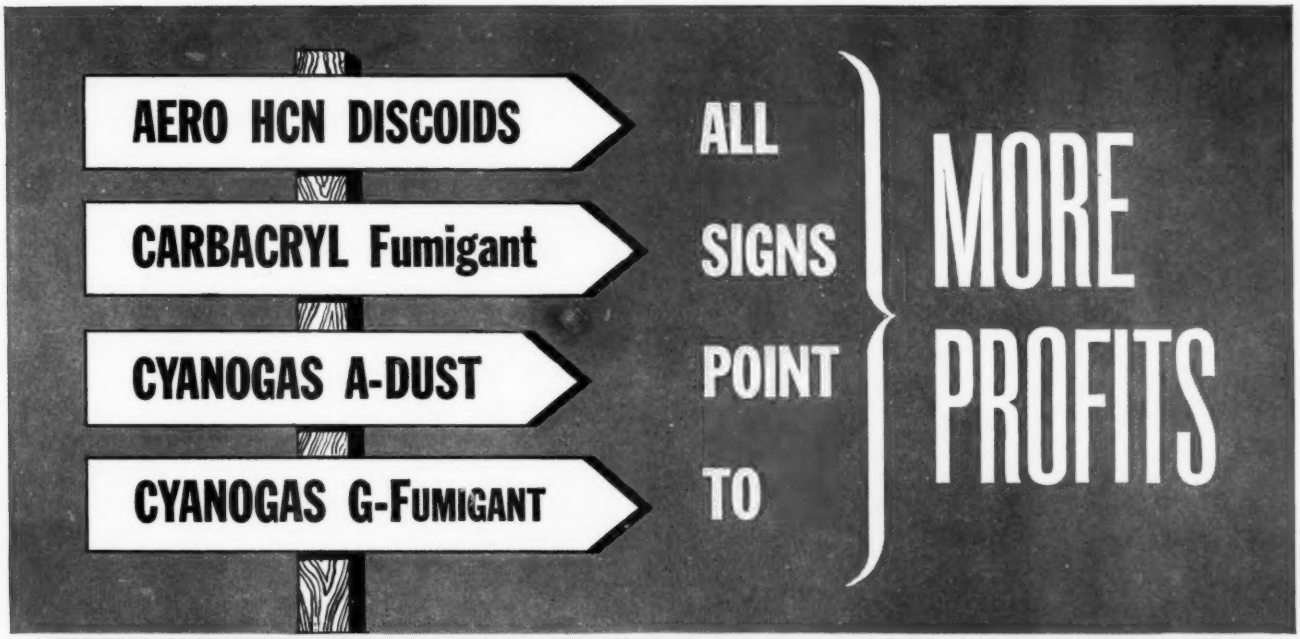
Viewed from the theoretical standpoint, it seems that the natural tendency would be for the population to return to its former normal condition after removal of all insecticides, even if mutations have occurred. The reason for this lies in the argument that a given species, after a great period of time, has reached a satisfactory equilibrium with its surroundings and the population has in its hereditary make-up all the characteristics which it is capable of producing to suit that environment.

The introduction of a chemical is an artificial re-arrangement of one part of the environment, and the individuals which survive this hazard, either by inherent resistance or by producing new mutations, are not necessarily those with the other charactistics best suited to survival in the absence of insecticide. With the removal of the chemicals, the tendency would be for the population to shift back, after a varying number of generations, to the previous norm. This could occur after a considerable length of time even if the population were completely isolated, but would be brought about even more rapidly if contact were made with non-resistant individuals from other populations. This aspect of the problem is one which should be investigated extensively under laboratory conditions, to determine if, in the absence of a given insecticide, the condition of non-resistance is regained after a lapse of generations.

5. *Specificity of resistance:* The question as to whether development of resistance refers to all insecticides or just the specific agent and related groups, is important when reports of developed resistance are received. Quayle (1938) showed that strains of the red scale in California resistant to HCN were also significantly more resistant to methyl bromide and ethylene oxide than the non-resistant strains. Again, in his work with the codling moth, Hough (1934) demonstrated that the Colorado race was resistant to a number of non-arsenical sprays in addition to the usual arsenicals. A very interesting observation was that relative resistance to HCN fumigation of the various strains was maintained in some stages of the life-cycle from egg to mature larva and not in others. However, Knipling (1942), working with the primary screwworm *Cochliomyia americana* C. and P., found that strains developing resistance against phenothiazine were not significantly more resistant to diphenylamine and diphenylene oxide than the ordinary strains. The specificity of resistance is another aspect of this whole problem which should receive close attention under laboratory conditions to anticipate, if possible, the occurence of similar problems in the field. Here, again, genetic techniques would find an excellent application in sorting out the factors for specific resistance.

6. *Effect of synergism:* Stated briefly, synergism is produced by two or more agents, such as insecticides, when the effect of the combination is not a simple sum-

(Continued on page 50)



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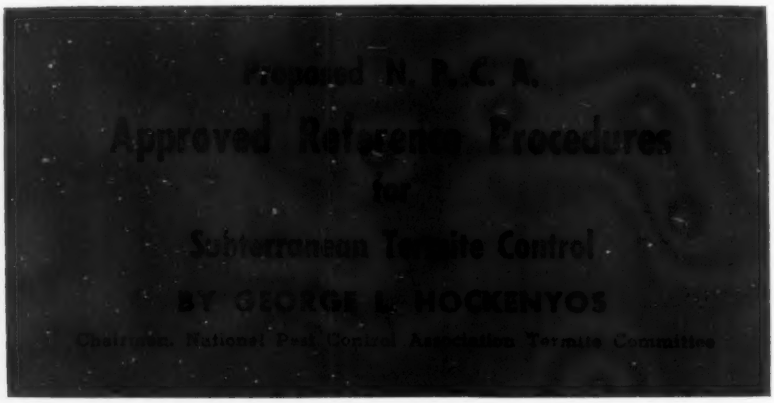

IN 1938 the National Pest Control Association adopted the so-called 1-2-3-3½ step procedure for control of subterranean termites. These steps were in the order of their emphasis as follows: (1) reconstruction, replacement and repair, (2) soil treating, (3) wall void (foundation) treating, and (3½) flushing between the top of foundation and overlying sill.

This outline has served a very useful purpose, but for quite some time a need has been felt for a more detailed set of approved procedures. At the time of the St. Louis National Convention the then termite committee chairman, Bert Lewis, emphasized the need for elaborating on the 1-2-3-3½ step outline. The committee, however, was aware of the great differences of opinion existing among termite operators and could not arrive at any further elaboration.

An increasing contact with operators from all regions of the country through the activities of the NPCA, has resulted in a better understanding of the factors which make for variation in the details of termite control work on a national scale. This year's committee has been set up on a regional basis with four large subcommittees representing the four major areas of termite control, namely, the East and Atlantic Seaboard, the South, the Midwest, and the West Coast.

It is the opinion of this year's committee that four and possibly five, factors determine the choice of procedure which should be followed in any particular subterranean control problem. These factors are:

1. The construction of the building involved.
2. The prevalence or incidence of infestation of subterranean termites.
3. Behavior of any given chemical in the local soil and local climate.
4. The economic problem of the customer or client.
5. The suspected and probable difference in behavior of different species of Reticulitermes.

To elaborate briefly on these factors, we all know there is a great difference in the prevailing types of construction in different regions. Basements or cellars exist under most homes in the East and Midwest. These are seldom found in the deep South or on the West Coast. Masonry foundations prevail in the Midwest while monolithic concrete foundations prevail on the West Coast and in much of the South supporting piers are widely used. On the other hand, earth filled porches are common to all regions. Subterranean termite control is concerned with that part of a structure which brings wood in contact with the soil, or is accessible to termites existing in the soil. It is concerned with porches, stoops, terraces, foundations and foundation sills, basement windows and window area-ways, posts, piers, lattices, skirting, coal bin partitions, cellar steps, etc.

50 Basic Elements

The committee assumed there were approximately fifty elements or details of construction which together made up the majority of the control problems in most of the structures with which termite operators in all parts of the country would be called upon to deal. If, therefore, control methods were prescribed for these some fifty elements, or details of construction, there would be available a detailed control procedure for most structures in the country.

It is well known that in many parts of the country termites are extremely prevalent, or, as it may be expressed, the incidence of infestation is very high. Where this is true any structure with elements of construction susceptible to termite attack is very apt to be infested sooner or later. In other regions termites may be substantially non-existent, and even the most susceptible buildings are not liable to attack. All degrees of termite hazard between these two extremes exist. Obviously, where termites are of rare occurrence a control service which merely kills out an existing infestation leaves little chance of recurrence. Equally obvious is the fact that in an area where termites are extremely prevalent the only assurance of satisfactory service must be based on very complete and thorough control methods, based on proper reconstruction and proper application of durable chemicals followed by frequent inspections and maintenance service.

The degree to which chemical treatments may supplement or even supplant reconstruction and the choice of the chemicals to be used will vary with the local soil and climate, among other things.

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Given chemicals behave differently in various soils and climates. This factor is poorly understood at present but is one that must be taken into account.

Choice of Procedure

In the last analysis the public calls upon the termite operator because termite damage and termite control is an economic problem. It is largely the economic situation of the property-owner that determines the choice of procedure to be followed in servicing his property. The construction of the building, the prevalence of termites in that area, the adaptability of the soil and climate to the use of chemicals, the value of the property involved, the probable damage and the financial status of the owner are all factors which enter into the economic problem of the client who calls upon the termite control operator.

In the face of these facts the committee has set up certain "Approved Reference Procedures" for each of the elements of construction depicted with some forty-four drawings prepared so far. As the name indicates, these are reference procedures designed to establish common points of reference in control procedure which ethical operators can use in their dealings with the public. The committee recognizes that there are so many variable factors that enter into any given termite job that rigid procedures would be useless in more cases than they would be useful.

Termite control work is not a mechanical art susceptible to rigid specifications. It has many of the elements of a profession and its proper performance depends on the use of professional judgment. The purpose of the Approved Reference Procedures is to establish a common language for termite control operators in their dealings with the public and with each other.

Differences of Species

A fifth factor which has not been well-established may be of much importance in choice of procedure in termite control work. This is the particular species of Reticulitermes involved. It is known that different species predominate in various parts of the country. It has been observed that there is far less tendency for subterranean termites to build tubes or galleries up over foundation walls on the West Coast than there is for them to do so in most regions east of the Rocky Mountains. Conceivably soil, soil moisture and other physical factors, or possibly some biological factors, could account for this difference in behavior. It seems more likely, however, that an actual difference in the behavior of the predominating species is involved.

George L. Hockenyos

To illustrate the use of the Approved Reference Procedure, there is presented here a drawing of Element of Construction No. 12 together with the Approved Reference Procedure in its tentative form. This tentative form has not been studied by all of the regional sub-committees and so may be modified before presentation to the NPCA for final approval.

The Approved Reference Procedure on NPCA Termite Drawing No. 12

EXPLANATION:

Illustrated is a cross section of a frame house with stucco on concrete foundation with the sill plate (mud sill) below grade. This is an old and generally unsatisfactory type of construction seldom used at present. Most existing houses of this type are old and are apt to be of low value. They are rather common in the East (with field stone foundations) and in parts of the Midwest. The wood post, of course, goes through the cement floor. Houses of this type frequently have had living quarters built into the basement.

DISCUSSION:

The termite hazard created by the wood post going through the cement floor is simply and easily corrected; the difficult part of control procedure centers on the presence of a sill below grade with only a layer of stucco between it and the soil.

Reconstruction is the only really satisfactory remedy for this situation except in areas of low incidence of infestation. However, the economic factor may necessitate less desirable methods of control in some cases.

Approved Reference Procedure

1. MECHANICAL ALTERATION:

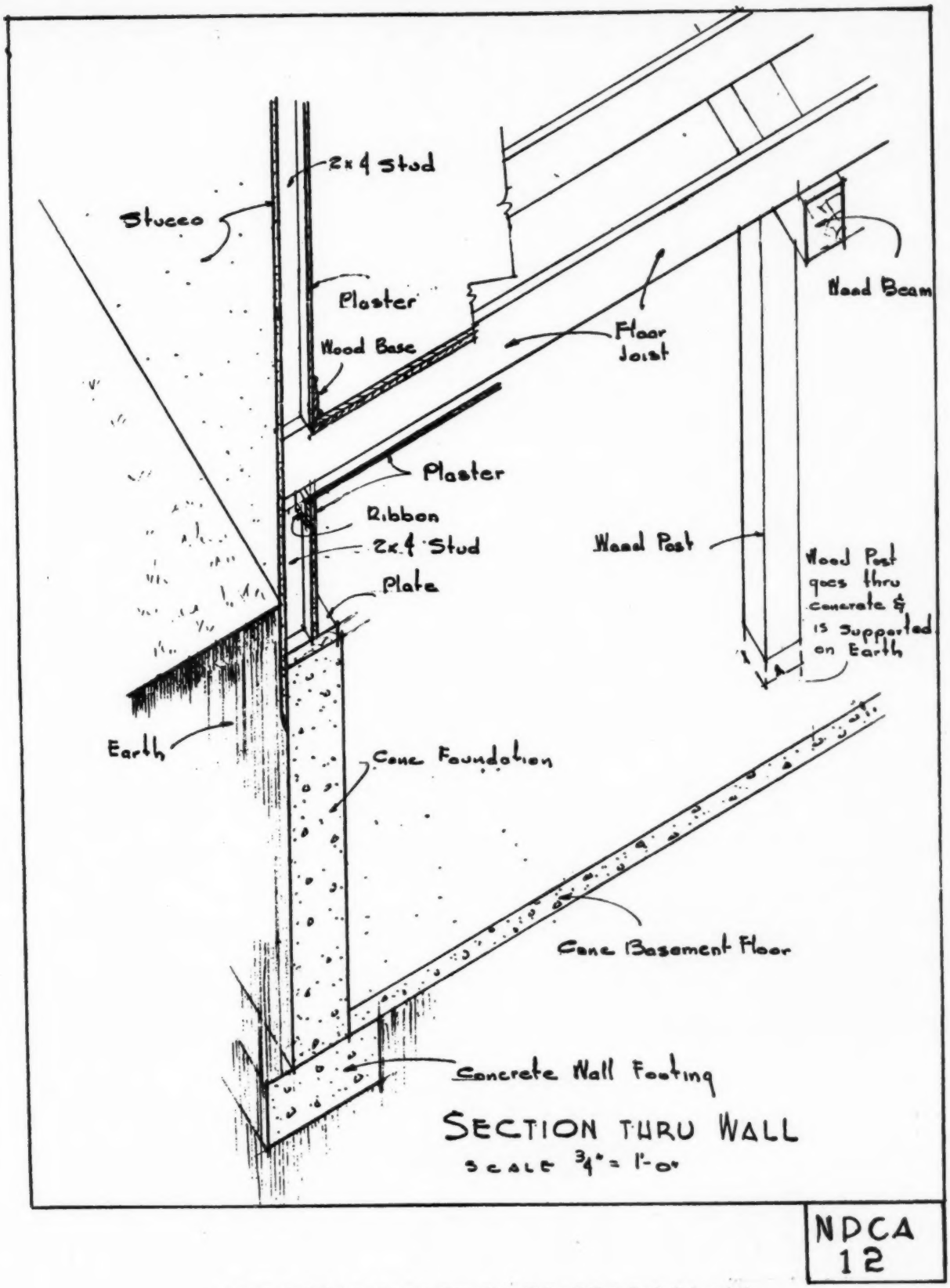
The preferred correction of this construction is to shore up the building, remove the sill plate and wall to the floor joists (or at least 6″ above grade), and raise the foundation to meet the floor joists or new sill plate. In any case the post should be removed and the soil under it treated, after which the hole in the floor should be filled with cement or concrete or a preformed solid concrete block may be used as a footing and either the old or a new post set in place.

These two operations alone would constitute complete control service if the foundation were sound. It would be advisable to watch for a time and see that trails or tubes were not dropped down from the infestation in the floor joists and studs to the soil.

A satisfactory correction of the vulnerable condition created by the sill being below grade can be made by installing a cement gutter of poured concrete or of preformed cement slabs so as to lower the grade to a point at least 4″ below the sill. If this is done, the stucco should be examined and any loose stucco removed below the sill to eliminate hidden channels of infestation.

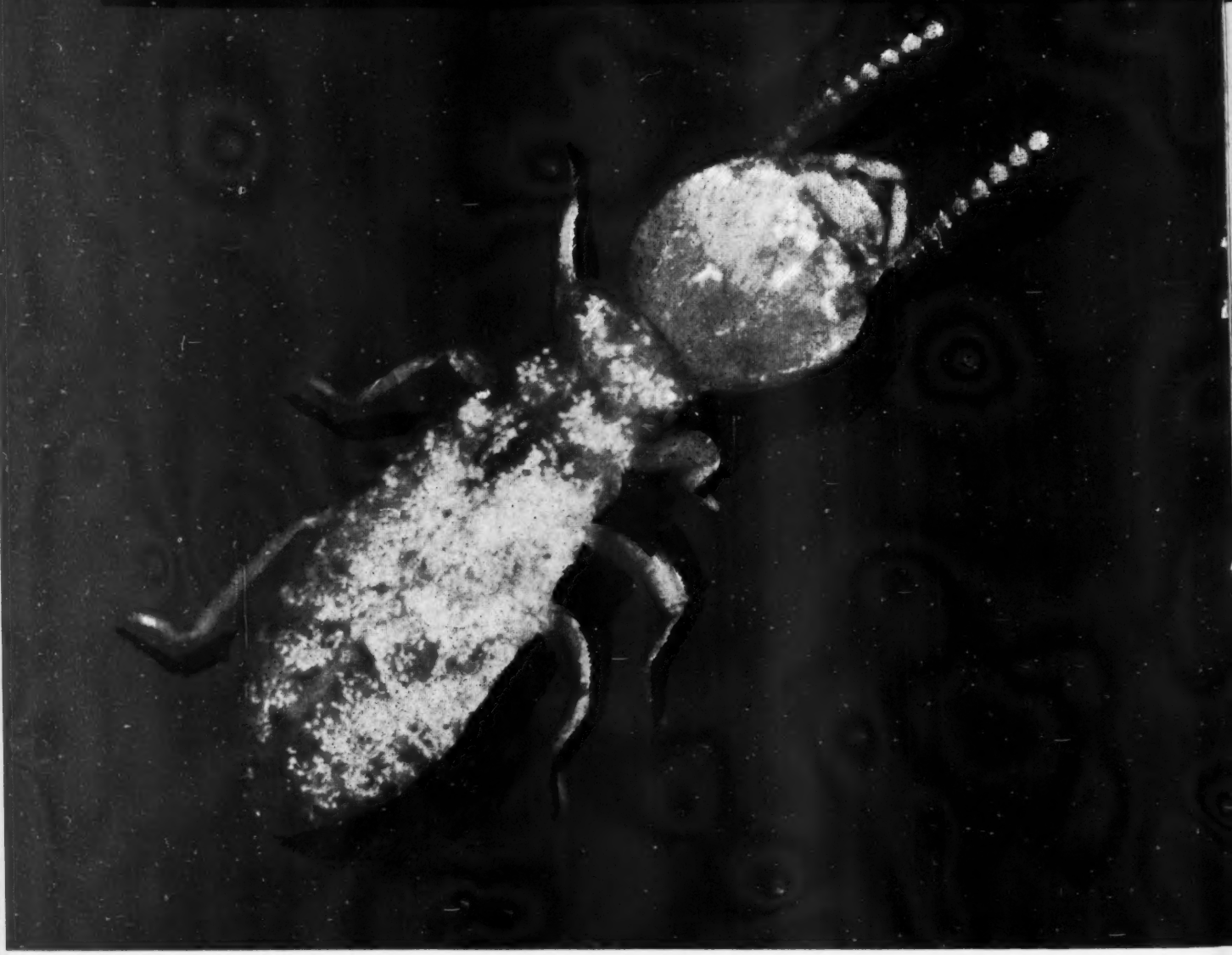
Less satisfactory would be to

(Continued on page 34)



Drawing furnished by Termite Committee, National Pest Control Association

TERMITE CONTROL



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(from page 30)

trench below the stucco and remove all loose stucco up to grade, after which a cement barrier such as a flash wall or a membrane barrier should be applied from above grade to at least 4″ below the sill.

If the preferred correction given in the first paragraph is followed no special provision for inspection is indicated. If however, one of the other methods is used, and most particularly if dependence is placed on soil treating, then a strip of plaster must be removed from the ceiling along the wall and be replaced with removable strips of some type of wall or plaster board to provide for adequate inspection of the ends of the floor joists. A similar strip must be removed from the wall just above the sill plate to provide inspection facilities for the sill and the studs.

2. SOIL TREATING:

If the mechanical alterations indicated above are carried out properly, soil treatment will be needed to only a very limited extent. The soil under the post should be treated, and, if colonies are located in the soil along the foundation, they should be given a localized application of soil treating chemical. This will serve to prevent swarming close to the house and reduce the likelihood of reinfestation should a defect develop in mechanical alterations.

No soil treatment is indicated for the soil under the basement floor unless swarming occurs through cracks in the floor. If this happens it may be necessary to drill the floor and treat the soil.

Treating the soil on the outside of the foundation without the mechanical alterations indicated involves serious risks of failure in the majority of cases. However, in areas where the soil absorbs and holds chemical well, where the incidence of infestation is not great, or where for any reason or combination of reasons a minimum cost treatment is indicated, then a heavy application of effective chemical from grade to well below the line of stucco may be justified. A treated backfill may well be the most effective type of soil treatment under the conditions.

3. FOUNDATION TREATING:

If the foundation is sound, no foundation treating is indicated. If, however, there are cracks or fissures, these should be flooded with an effective chemical and repaired. If the cracks are too small to be flooded, they should be drilled and then flooded, after which a mechanical plug should be inserted.

4. WOOD TREATING:

If the foundation is raised above grade by means of poured concrete or other impervious material, then no wood treating is indicated, except that infestations in accessible wooden members may be eliminated by drilling and treating the infested wood in order to prevent swarming from the wood, if swarming is incipient.

If the foundation is not raised, then the additional protection of wood treatment is indicated, even though one of the other mechanical alterations has been made. This treatment should consist of thorough flushing between the sill plate and the foundation, between the sill plate and the stucco, and between the studs and the stucco, as well as between the sill plates and the studs.

Dr. Ralph Heal is First NPCA Technical Director

Dr. Ralph Edward Heal, highly-qualified authority with both university and industry research experience in entomology and pest control, is to be the first Technical Director of the National Pest Control Association. This announcement has just been made by the Association's executive secretary, William O. Buettner.

Dr. Heal's appointment comes after almost a year of careful investigation by the NPCA's Board of Directors into the qualifications of possible candidates for the position authorized by the membership at its convention last year. He will be formally introduced at the NPCA convention being held in Los Angeles, California, October 17-19, but will not officially begin work until about November 1st.

Dr. Ralph E. Heal

A graduate with a Bachelor of Science and Arts degree in entomology - zoology from Ontario Agricultural College in 1934, Dr. Heal earned both his M.S. and Ph.D. degrees in entomology at Rutgers University. Between 1935 and 1942, he was a Research Fellow working on projects for Monsanto Chemical Co., Bristol-Myers Co., and Merck & Co., Inc. From 1942 up to the present time, Dr. Heal has been Senior Entomologist, Head of the Entomological Laboratory of the Research and Development Division, Merck & Co., Inc., New York city.

Extensive work with insects and pest control chemicals is included in the background of the new technical director. He has had research experience in the extraction of derris root; use of wetting agents in agricultural pesticides; development of insecticides and baits for the control of cockroaches and ants; and development and evaluation of mothproofing agents, insect repellents and pediculicides. Dr. Heal's work also included a survey of botanical and synthetic organic insecticides; discovery, development and introduction of *Ryania speciosa* as a new insecticide; and pharmacological and toxicological investigations with insecticides.

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Prices: WHEAT Rechargeable Spotlight, $26.95 Lamp Recharger, $10.00
Automobile Cigar Lighter Charger, $3.00
f.o.b. Cleveland, Ohio

➡ **DEALERSHIPS AVAILABLE**

Faucet Not Included

TRU-OIL-GAGE

FOR 55 GALLON DRUMS

Accurate-Convenient
Easily Installed

No Parts to Get Out of Order

Designed on the simple, trouble-free and most accurate principle of liquid seeking its own level. No more guessing — no more messy "stick" measuring. Reserve in the drum is noted at a glance. Diagram with instructions on each carton. Important—Safety valve checks the flow in case of accident or fire.

PRICES

$3.50 6 or More $3.00 each
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➡ **DEALERSHIPS AVAILABLE**

SPECIFICATIONS

• Top quality bronze T fitting • Standard tapered ¾" pipe thread for use on any standard 55 gal. drum • Has ½" leeway for possible variation in drums • 5 gal. red numeral calibrations on clear tubing • contains red cork float • Strong rust-proof bracket & bolt to secure to top rim of drum. Brass cap and screen air vent — guard against fire and dirt • With compression nut & gasket to secure gauge tube to bronze fitting • Accurate machined & assembled • Weighs approximately 1 lb. in corrugated shipping box.

Many companies are giving these oil gauges away with 55 gal. drum orders.

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➡ **See These Useful Tools at the NPCA Convention Booth No. 23**

PCOs Meet in Los Angeles for 17th Annual NPCA Convention, Oct. 17-19

Termites and General Pest Control Are Topics of Concurrent Sessions This Year

As Robert B. Mesecher, national chairman, brings down the gavel Monday morning, October 17th at 9 a.m., the 17th annual convention of the National Pest Control Association officially gets under way. Meeting this year in Los Angeles, California, at the Biltmore Hotel, the convention registration is expected to exceed 600 when the three-day meeting closes October 19th. PCOs from the state of California alone, which has over 600 licensed operators, are expected to swell the numbers to bring about perhaps the largest attendance in the Association's history.

Termites and general pest control problems are being discussed in separate concurrent sessions at the convention, with experts in each field leading the discussions. Government leaders, university research men and well-experienced industry personnel are on the program given in complete form below.

Dr. S. A. Rohwer, assistant chief, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Dr. Thomas E. Synder, termite authority from the BE&PQ, USDA, and Walter W. Dykstra, rodent control branch, Fish & Wildlife Service, U. S. Department of the Interior, head up the list of government men from Washington who are giving major addresses.

It is expected that George L. Hockenyos, past NPCA prexy and chairman of the Association's termite committee, will present a "first draft" final form of the "Approved Recommended Procedures" for termite control in the United States.

For delegates who have special

Convention Program

SUNDAY, OCTOBER 16, 1949

1:00 to 9:00 P.M.—Registration in the Galleria

2:00 P. M. — Annual Meeting of the Board of Directors in Conference Room No. 1.

●

NOTE: Tuesday morning's session on general pest control will feature an open forum on moths, carpet beetles, laws and enforcement, roaches, silverfish, stored products insects. Anyone having questions on these subjects are asked to write their questions and deposit them in the box at the registration desk.

●

MONDAY A.M., OCT. 17, 1949
Ballroom

9:00 A.M.—Meeting called to Order
Robert B. Mesecher
National Anthem Ron W. Hunt
Lucile N. Hunt, Accompanist
Invocation . . . Lyman P. Pinkston
Memorial Service . . H. K. Steckel
Welcome . . . Raymond V. Darby
President's Annual Message
V. H. Montgomery
"History of Pest Control for Past Fifty Years" . . Prof. J. J. Davis
"Pest Control of the Present Day" . . . . . C. Norman Dold
"What We May Expect in Pest Control in the Next Fifty Years"
Lee C. Truman
"What the Agricultural Experiment Stations Have to Offer the PCO"
Dr. Al. M. Boyce
Recess (five minutes)

Closed Business Session
(NPCA Members Only)
V. H. Montgomery, Presiding
Executive Secretary's Report
William O. Buettner
Treasurer's Report
Robert C. Yeager
Appointments of Committees and General Business,
V. H. Montgomery
12:15 P.M. Luncheon—Biltmore Bowl
"Do You Take the Time?"
William John Lloyd

●

MONDAY AFTERNOON

GROUP "A" — Ballroom
(Wood Destroying Organisms — Emphasis on Subterranean Termites)
Harold J. Davies, Presiding
2:00 P.M. — Termite Committee Report . . . George L. Hockenyos
3:00 P.M. — Open Forum — George L. Hockenyos assisted by Dr. Thos. E. Snyder, J. L. Howell, Fred J. Bowers, W. K. Delaplane, Jr., D. C. Tracy and W. H. McCain.
3:30 P.M. — Subterranean Termite Treating Methods and Business Technique of California.
A panel will discuss:
1. Importance of a Written Report" . . . . . George A. Taubert
2. "Seal-Offs" . . . Ralph E. Oliver
3. "Below-Grade Foundation and Ventilation Factors"
Joseph A. Goulding
4. "Chemicals" . . Wayne K. Davis

Open Forum — George A. Taubert, Ralph E. Oliver, Joseph A. Goulding, Wayne K. Davis and Herbert R. Packard, Jr.

GROUP "B"
Conference Room No. 1
General Pest Control
Basil Gough, Presiding
2:00 P.M. — "How to Make a Rat Control Survey"
V. H. Montgomery
2:15 P.M.—"California State Position Regarding Rodent Control"
Howard B. Hollander
2:30 P.M. — "Rodenticides" (How to use, Toxicity, Results)
Edward W. Bushing

Open Forum — Elmer Kuntz assisted by Howard B. Hollander, Walter W. Dykstra, Kenneth C. Bell, Edward Bushing and V. H. Montgomery.

3:00 P.M. — "Ant Control" — 1. Household, 2. Yard, 3. Chemicals and Equipment
Dr. E. Gorton Linsley

Open Forum — Dr. E. Gorton Linsley assisted by Arnold Alderman, W. E. McCauley, J. Harry Britt, James R. Daniels and Russell G. Clark
3:45 P.M. — "New Insecticides" (Trends and Future Aspects)
Dr. Ralph L. Metcalf

Open Forum led by Dr. Metcalf

●

MONDAY EVENING

7:30 P.M. — Booth Exhibits.
9:00 P.M. — Informal Get-together Everyone, including guests are invited to visit exhibits.
in Ballroom. Entertainment. Famous Reunion.

pest control problems they would like to have discussed at the convention, a question box is located at the registration desk into which requests should be placed for the open forum being held Tuesday morning at 10:15.

Meetings are being held in the Biltmore's Ballroom, in Conference Room No. 1, and in the Biltmore Bowl. The major part of the convention is divided into two sessions, one on wood destroying organisms, and the other on general pest control. The first meeting each day is one for the general assembly of both groups to hear outstanding speakers on subjects of mutual interest to all pest control men. The only closed sessions restricted to NPCA members shown on the program are held during the last half of Monday and Wednesday morning's meetings.

Luncheon speakers include: William John Lloyd, assistant cashier, Bank of America, Los Angeles, who is speaking on Tues-

day with with an address entitled, "Do You Take The Time?", and Vic Ekdahl's talk, "Selling Is Like That" on Wednesday. There is no special luncheon on Tuesday.

Business and festivities come to a close with the annual banquet and dance being held Wednesday evening, October 19th in the Biltmore Bowl. George Aitkenhead is toastmaster and we're told there'll be a special surprise Los Angeles souvenir for each lady present.

The ladies are taking part in an active program all of their own which includes sightseeing, eating in especially famous restaurants, and opportunities to shop in some of Los Angeles' best department stores.

Responsibility for the success of this year's program lies with the hard working committees. On the national convention committee were: Robert B. Mesecher, chairman, assisted by I. B. Carncross, Wayne K. Davis, H. O. Abel, Charles C. Delk, Myron Semplinger, William H. McCain, Fred York, Jr., George L. Hockenyos, George R. Elliott, D. C. Tracy, and William O. Buettner. The Los Angeles committee consisted of Hugh C. Smith, chairman, Herbert R. Packard, Jr., secretary, and D. C. Tracy, treasurer. Los Angeles sub-committee chairmen

(Continued on page 62)

TUESDAY A.M., OCT. 18, 1949
Ballroom
9:00 A.M. — General Assembly of Groups "A" and "B"
J. Wilfred Gunn, Presiding
"Fumigation, Including Drywood Termite Fumigation" . . Karl Hassler
Open Forum — Karl Hassler assisted by Lyman P. Pinkston, Arlo Thomas, G. Darrell Cardiff and J. Wilfred Gunn.
10:00 A.M. — "What Happens When A Termite Inspector Misses a Stall Shower" . . . . . William Thomas
Recess (five minutes)

GROUP "A" — Ballroom
(Wood Destroying Organism
D. C. Tracy, Presiding
10:15 A.M. — Motion Picture followed by discussion
11:00 A.M. — Business Mechanics Section of NPCA Termite Committee . . . . . W. H. McCain
Open Forum, Mr. McCain assisted by Stanley L. Lind, A.H. Bender, Robbert B. Mesecher, T. Roy Young and Harold Schnorrenberg.

GROUP "B"
Conference Room No. 1
(General Pest Control)
Harold E. Jennings, Presiding
10:15 A.M. — An Open Forum designed to allow for questions and discussion on Moths, Carpet Beetles, Laws and Enforcement, Roaches, Silverfish, Stored Products Insects.
Panel: Dr. E. O. Essig, Dr. W. Dwight Pierce, Charles L. Senn, H. K. Steckel, W. E. McCauley, Prof. J. J. Davis, I. B. Carncross, Herman L. Fellton, J. F. Graham and Dr. A. E. Michelbacher.

TUESDAY AFTERNOON
Committee Meetings Only.

●

TUESDAY EVENING
Ballroom
"Forty-Niner" Night
8:00 P.M. — Featured Entertainment
9:00 P.M. — '49ers Dance.

●

WEDNESDAY, A.M., OCT. 19, 1949
Ballroom
9:00 A.M. — General Assembly of Groups "A" and "B"
William O. Buettner, Presiding
"Important Factors in the Control of House Mice"
Walter W. Dykstra
9:30 A.M. — "The Overall Insecticide Situation," Dr. S. A. Rohwer
Recess — (five minutes)
10:15 A.M.—NPCA Business Meeting
V. H. Montgomery, Presiding
(a) Unfinished Business
(b) New Business
(c) Report of Nominating Committee
(d) Election of Officers, Directors
(e) Resolutions
12:30 P.M.—Luncheon, Biltmore Bowl
"Selling Is Like That"
Vic Ekdahl

●

WEDNESDAY AFTERNOON
Separate Meetings of Groups A & B
GROUP "A" — Ballroom
(Wood Destroying Organisms)
Clifford Hodel, Presiding
2.00 P.M. — Minimum Code of Los Angeles District, Pest Control Operators of California, Inc.
Herbert R. Packard, Jr.
Open Forum — Herbert R. Packard, Jr., assisted by Karl Hassler, Kenneth G. Scott and Ralph E. Oliver
3:00 P.M. — Legislation
Florida and Louisiana
Theodore Oser
Alabama and Arkansas
A. S. Krawcheck
Mississippi . . . . . J. C. Redd
Tennessee . . . . . Walter B. Hill
California . . . . . J. Wilfred Gunn
4:00 P.M. — "Future Needs and Recent Advances in Termite and Borer Control"
Dr. Thomas E. Snyder

GROUP "B"
Conference Room No. 1
(General Pest Control)
Charles C. Delk, Presiding
2:00 P.M. — "What Are You Delivering" . . . Charles J. Menard
2:20 P.M. — "Comments on Pacific Coast PCO Conferences"
Dr. M. A. Stewart
2:30 P.M. — "Identification of General Pests Made Easy"
Ron W. Hunt
Open Forum
3:00 P.M. — Methods and Gadgets to Make Pest Control Work Easier" . . . . . Martin T. Meyer
Open Forum
3:30 P.M. — "Fly Control"
Dr. R. B. March
Open Forum

●

WEDNESDAY EVENING
Biltmore Bowl
7:00 P.M. — Annual Banquet
(Dress Optional — Men, informal)
George G. Aitkenhead, Toastmaster
Dancing will follow the banquet.

Congratulations

to the

PEST CONTROL INDUSTRY

for seventeen years of progress celebrated at your

LOS ANGELES CONVENTION

from

B. & D. A. WEISBURGER

Insurance Brokers Since 1915

Experienced in all types of dependable

RODENTICIDE & INSECTICIDE INSURANCE

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The Pest Control Operator And Allied Industries

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Coverage in representative American Stock Companies on:

Public Liability (including 1080)
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And All Allied Lines

As well as Life Insurance and All Types of Employee Insurance Plans

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34 Years of specialized experience in solving technical pest control insurance problems

MEMBER NATIONAL PEST CONTROL ASSOCIATION

Our Mr. Dave Weisburger will be at the Biltmore Hotel during the convention to offer help and answer any questions.

B. & D. A. WEISBURGER

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for the

PEST CONTROL OPERATOR!

M.S.A. supplies the safety equipment you need for dependable protection in pest control on the job . . . developed by intensive research and quality—built by the world's largest manufacturer of approved safety products. You're sure of safe performance and top wearing comfort when you specify M.S.A.—all the way!

M·S·A CHEMOX* OXYGEN BREATHING APPARATUS

Self-generates oxygen as you breathe, using replaceable canister! Respiratory safety in *any* gaseous or oxygen-deficient atmosphere.

M·S·A DDT RESPIRATOR

Replaceable twin chemical cartridges prevent inhalation of DDT and DDT solvents or carriers. Easy-fitting facepiece.

M·S·A GMC-1 GAS MASK

With replaceable GMC-1 canister, protects against organic phosphates such as H.E.T.P., Parathion, T.E.P.P., and other new fumigants.

M·S·A HCN GAS MASK

Protects against HCN concentrations wherever enough air is present to support life. Long-lasting, replaceable canisters.

M·S·A DUST RESPIRATOR

Popular M.S.A. Comfo and Dustfoe models provide ALL-DUST breathing protection, with inexpensive throwaway filters.

M·S·A GAS TIGHT GOGGLES

Keep gases, mists and irritating dusts out of eyes. Non-fogging water chamber design.

M·S·A FEND HAND CREAMS

When rubbed on the skin, provide protective barrier against irritants. Easily washed off after work.

M·S·A FIRST AID KITS

Unit-packaged first aid treatments, ready for instant use. Dust and moisture-proof steel cases.

Write for descriptive Bulletins on these outstanding M·S·A Products!

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V. H. Montgomery
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Syracuse, New York

Dr. C. A. Trimbos
Dallas, Texas

William Q. Phippard
Cincinnati, Ohio

Herman L. Fellton
Atlanta, Georgia

•

Regional Vice-President

Not Pictured:

Harold E. Jennings

Chicago, Illinois

•

Robert B. Mezecher
Burbank, California

PEST CONTROL

NEWS

U. of Cal. PCO Course

The University of California has added a course in structural pest control to its University Extension program. Listed as "Entomology 810ABC", the course is being given at Woodbury College, 1027 Wilshire Blvd. by Ronald W. Hunt, owner of the Western Pest Control Service, Whittier, Cal. A notice from the university states the course will include, "Pertinent information in all fields of 'structural' or household pest control industry. Insect pests, fungi, and rodents; important laws, structural phases of control, methods, equipment, and public relations." It is open to licensed PCOs, students, and to all those connected with the building industry. It began on September 13th and will have 18 meetings. Registration fee is $27.00.

Award for Extermital

The Direct Mail Advertising Association of New York awarded Extermital Chemicals, Inc., Dayton, Ohio a certificate for the "best direct mail campaign in the exterminating industry for 1949," at its 32nd annual conference held in Chicago, September 21st. Extermital's campaign consisted of letters sent to Building & Loan companies to see how they regarded the termite problem, and other pieces which were purely promotional. William H. McCain is president of the company receiving the award.

Hatfield Joins Monsanto

Dr. Ira Hatfield, well-known to PCOs for his contribution to the advancement of the industry's knowledge of wood-boring insect control, has joined the sales development department, organic division, Monsanto Chemical Co., St. Louis, Mo. to give service on wood preservation and related problems.

Newlyweds, Mr. and Mrs. Jordan

Arab's Jordan Marries

Mr. and Mrs. H. B. Jordan became man and wife in the St. James Methodist Church, Danville, Illinois on August 3rd. Jordan is with Arab Pest Control Co. in Indianapolis, Indiana. He and his wife, Joyce, are spending their honeymoon in California during October and plan to attend the NPCA convention in Los Angeles.

Kotler Heads Zionists

Louis Kotler, Orkin Exterminating Co., Memphis, Tenn., was elected to the presidency of the Memphis Zionist District at the annual election which was part of the recent Zionist picnic at Rainbow Lake, near Memphis. Kotler served the district 13 years as secretary and as vice-president for the last 4 years.

Chester Pencille Dies

Chester W. Pencille, 45, president of the Guarantee Fumigating Co., Los Angeles, who long had been suffering from pains received when he was blown through a stucco wall following the fumigation explosion on December 4, 1947, took his own life August 20th. Pencille was one of the pioneers in the use of fumigation for the control of drywood termites and was active in making extensive tests in this medium.

Over 100 PCOs attended the funeral, including V. H. Montgomer, NPCA president. Mr. Pencille willed his body to the UCLA for experimental purposes.

Safety In Use of Pesticides Stressed at NACA Convention

The agricultural chemical industry's activities to guard and protect food and food supplies were highlighted at the 16th annual meeting of the National Agricultural Chemicals Association held at Spring Lake, N. J., September 7-9.

Ernest Hart, vice president of Food Machinery & Chemical Corp., San Jose, Calif., and vice-president of the company's Niagara Chemical division was elected president of the NACA. Lea S. Hitchner was reelected executive secretary.

Tolerance Hearings to Start in January

Dr. T. B. Bellis, of the Food and Drug Administration, told the convention that hearings to establish regulations under section 406 (a) of the food, drug and cosmetic act for limiting quantities of poisonous substances to be tolerated in or on foods will get under way in January.

Self-Protection Necessary

We need not bow to economic pests, but can use to the fullest advantage the potent new insecticides if the user is scrupulous in protecting himself, was the opinion expressed at the meeting by Dr. J. G. Townsend, chief, Division of Industrial Hygiene, U. S. Public Health Service. "On the farm, as well as in the factory, dangerous chemicals may be used safely with proper precautions. Too much emphasis cannot be put on education of the person who may be exposed to these chemicals. Correct information insures safe practices and wipes out apprehension and distortion of the facts," Dr. Townsend said.

Industry Responsible Says AMA Official

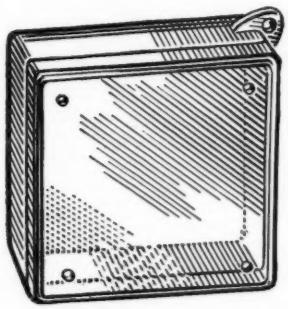
"Responsibility for safety (in foods) must be assumed by the industries contributing to its production. Accidents due to lack of pre-testing, or hysteria produced by fear of accidents, could easily be the trigger mechanism setting off a series of hasty investigations and the enactment of hastily conceived laws and regulations which could easily retard real progress,"

CARGILLE Transparent Plastic

FUMIGATION TEST CAGES

For Testing the Effectiveness of Fumigations

In flour mills, grain elevators, box cars and fumigation chambers, warehouses, bakeries, food plants, and in all establishments where fumigation is required for insect control.



Outside Dimensions of Cage: 1⅞" x 1⅞" x ¾"

One side specially prepared for marking identification numbers with pencil or ink.

Diameter of holes is approximately 0.020" — small enough to prevent escape of the insects.

Cargille Transparent Plastic Fumigation Test Cages offer these advantages:

- Ready to use
- Easily marked with identifying numbers
- String can be easily attached when needed
- Flat, square shape is convenient for stacking and storing the cages
- **Transparency permits contents to be examined without opening the box**

DIRECTIONS FOR USE

Place 10 living insects (such as confused flour beetles, sawtooth grain beetles, etc.) in each cage and set these cages in various locations throughout the area to be fumigated.

Following fumigation simply count dead insects to determine effectiveness of control.

PRICE: Cargille Transparent Fumigation Test Cages (Test Cage No. 1) as described

Per dozen — **$2.40**; per gross — **$21.60**

F. O. B. New York; TERMS: 1% 10; Net 30 Days

(We pay transportation when remittance accompanies order)

The design of the Cargille Test Cage was developed in cooperation with authorities on fumigation procedure.

R. P. Cargille

Products for Scientific Laboratories

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said Dr. James R. Wilson, secretary, Council on Foods and Nutrition, American Medical Association, who gave one of the major addresses.

"In a democracy self-control and self-regulation is a large and essential part of our way of life," Dr. Wilson continued. He also urged the NACA to consider seriously the possibility of organizing a jointly sponsored institute or foundation which could "correlate the necessary pre-testing of pesticides."

Dr. Wilson declared the AMA is concerned over the great many new chemical agents being introduced. Many have not been completely tested, he said.

Dr. Henry F. Smythe, Jr. of the Mellon Institute in Pittsburgh estimated that present testing laboratories are capable of thoroughly testing between ten and twenty new agricultural chemicals each year. The new products now reaching a wide market have been thoroughly pre-tested, he maintained.

Wood Preservatives Literature

Chapman Chemical Co., manufacturers of wood preservatives and insecticides, has issued a new folder on their line of chemical wood preservatives. Designed to give general information on several of their products, including Penta Preservative, Ambrocide, Permatox 10-S and Permatox WR, the bulletin has been printed in both English and Spanish.

Title of the folder is, "How to Protect Wood Chemically". Copies can be obtained by writing the Chapman Chemical Co., 707 Dermon Building, Memphis 3, Tenn.

Kansas Entomology Prof.

Dr. Howard E. Evans has been appointed assistant professor of entomology at Kansas State college, Manhattan, Kansas. He fills the teaching vacany made by the retirement of Dr. George A. Dean.

A native of E. Hartford, Conn., Dr. Evans received his doctorate from Cornell this summer, where he did research on *pompilidae*, or spider wasps.

Jack Benmosche

Benmosche Sole PCE Owner

Jack Benmosche, owner of the Pest Control Equipment Co., New York city, recently announced that Philip Mayer, Jr. is no longer associated with the firm. Mayer resigned in order to devote full time to the operation of his Evins Exterminating Co.

Both Benmosche and Mayer have been actively working in the pest control industry for over 12 years, but as the Pest Control Equipment Company grew through increased business, the former needed to concentrate his work on the building of better service through PCE, it was stated.

Munch Urges PR Grow Squill

Dr. James C. Munch, pharmacy professor at Pittsburgh's Temple University, recently made a trip to the West Indies. While in Puerto Rico, he convinced agricultural experts to bolster the island's economy by cultivating red squill, the bulbous herb which is chief ingredient in one effective rodenticide. Red Squill is now grown commercially along the Mediterranean, but Dr. Munch found Puerto Rico's climate and soil were both suitable for its growth there.

Boy Scout Camp Protected

D. P. Lewis, sales manager and secretary of the H. D. Hudson Mfg. Co., sprayer manufacturers in Chicago, Ill., has long been active in Boy Scout activities. Recently he, and William Dickison, the company's research director, sprayed the Boy Scout camp at Wild Rose, Wisconsin with DDT to provide extra safety and sanitation. Naturally, the sprayers used were of the Hudson manufacturer, with a 150 gallon power unit with 5 g. p. m. discharge mounted on a pick-up truck treating the general camp areas and buildings, and Hudson's knapsack and compression sprayers taking care of tent camping sites.

New Lindane Concentrate

Niagara Chemical Division, Food Machinery & Chemical Corporation, Middleport, New York, is now offering Gam-Kil 25 Concentrate, an oil base formulation containing 25% Lindane.

According to L. G. Mayne, heading up Niagara's sales to the pest control industry, Gam-Kil 25 Concentrate affords effective control of bedbugs, carpet beetles, cockroaches, clothes moths, houseflies, wasps, mosquitoes, ants and some fleas.

Mayne reports that Niagara also manufacturers a water-miscible concentrate, Gam-Kil 25 Emulsion, for those who prefer this type. Further information can be obtained by writing the company at the address given above.

General Purpose Disinfectant

"Scento-Pine," a new disinfectant, deodorizer and cleanser has been introduced by Huntington Laboratories, Inc., Huntington, Ind., according to the company's president, J. L. Brenn. In recommended use concentrations, it is said to be effective against both fungi and bacteria. To make an effective germicidal solution, Scento-Pine is diluted one part to 100 parts of water.

Brenn states that this general purpose disinfectant is suggested for foot baths in shower rooms, for rinsing floors, walls, urinals and commodes in schools, hospitals and other public buildings. Further information can be obtained by writing the company.

PCO'S: We're hoping to meet you personally at the California Convention and take this opportunity to extend to you a most cordial invitation to visit our Preshur-Mite exhibit.

EWING MANUFACTURING CO.
JACKSON, MISSISSIPPI

"TOX-EOL"

for TERMITE CONTROL

Backed by 15 Years Effective Use

FOR WOOD AND SOIL TREATMENT

PRACTICALLY STAINLESS!

NO LASTING ODORS!

Available in a 12½ to 1 Concentrate

Advertising and dealer cooperation furnished contract agents including a 5-year warranty. We only have a few open territories but yours might be open. Write today for details.

CRE-O-TOX CHEMICAL COMPANY

Pioneers in the use of chlorinated phenols for termite control.

Broad St. at Union R. R. | Box 5218 | Memphis (12) Tennessee

"RAT-GLU"

Catches RATS and MICE Like Flies on Fly Paper

NEEDS NO *Poison* OR *Bait*

WHOLESALE AND RETAIL

for prices and particulars write to

JOSEPH GABOS

SOUTH DELSEA DRIVE

REG. 1 VINELAND, N. J.

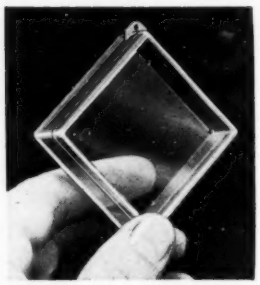
Syntron Drill in Operation

Self-Rotating Syntron Drill

A new Syntron Electric Hammer Drill, reported to be the first such hammer to both hammer and rotate the drill bit at the same time, is now being marketed. It will drill up to 2-inch diameter holes, is of electromagnetic design with a free-striking piston, has an automatic safety clutch on the rotating drive that will slip if the bit binds or gets stuck in its hole, the precussive hammering can be stopped while the bit continues to rotate to clean the hole and weighs 38½ lbs. Identified as Model 25-RO, the Syntron Electric Hammer is available for either 110 or 220 volt A. C. operation. Full information can be obtained from the Syntron Company, 790 Lexington Ave., Homer City, Pa.

Experimental Registration Of Compound 42 Granted

Both R. J. Prentiss & Co. and S. B. Penick & Co., New York city, have been granted an experimental registration permit for the sale of Compound 42, promising new rodenticide developed at the Wisconsin Alumni Research Foundation. To be available in 5 lb. lots only, Compound 42 can solely be used by experienced personal for experimental applications on which a written report must be given. Further details can be obtained by writing R. J. Prentiss & Co., 110 William Street, New York city, or S. B. Penick & Co., 50 Church Street, New York city.



Cargille Test Cage

New Fumigation Test Cages

R. P. Cargille, suppliers of scientific apparatus, 118 Liberty Street, New York 6, N. Y., announces the availability of its new fumigation test cages made of transparent plastic. In addition to the feature of transparency, which permits the contents to be examined after fumigation without opening the box, advantages claimed are that the boxes are always ready to use, are easily marked with identifying numbers, string can be easily attached as needed, and the flat, square shape is convenient for stacking and storing the case. The design of this Cargille Test Cage has been

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for termite controls···
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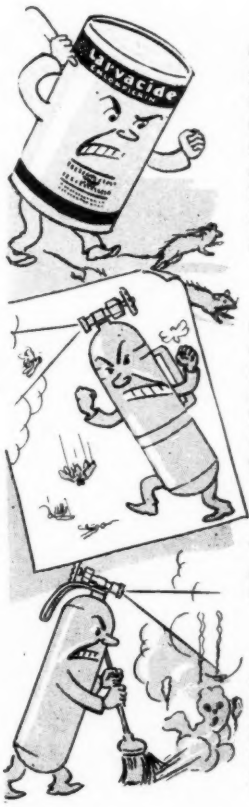

PCOs recommend LARVACIDE, the penetrating tear gas fumigant, for sure cure of rat control problems. The handy one lb. cans of LARVACIDE are standard equipment wherever they go, for they never know when they'll need this all-around, fast-acting fumigant.

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developed in cooperation with authorities on fumigation procedure, it is reported. Leaflet and sample will be sent on request.

Rat Jigger 1080 Cup

Universal Paper Products Co. announces the availability of its new, improved Rat Jigger Brand Rodenticide Containers, an early model of which was first shown at the 1948 NPCA convention.

Reported to have been developed at the request of Federal agencies and exhaustively tested in government laboratories and field stations, the Rat Jigger is said to meet all specifications established by the National Research Council in its recommendations for safe handling procedures, including the requirements for an acceptable type of single-use individual dispenser for 1080 compound.

Printed in black on a dark brown body, the "skull and crossbones — Poison" warning legend is visible even when dyed solutions are used. This new type container has a flared "skirt" which makes it tip-proof. Resulting stability is said to eliminate the need for fastening cup down.

To do away with the danger of slow seepage in which crystals form on the outside of the container thus contaminating the placement area, the Council's recommendations specified that such

poison receptacles should "permit no loss of liquid by penetration or seepage for a period of three days." Rat Jiggers are said to stand up 18 days or better giving a considerable margin of safety. Full information is available from the manufacturer, Universal Paper Products Co., 380 Lexington Ave., New York 17, N. Y., or Pest Control Equipment Co., 47 West 43rd St., New York 18.

ECA-Small Businessmen Guide

The Economic Cooperation Administration has issued a booklet designed to assist American small businessmen who plan to enter the export market under the Marshall plan. The booklet, entitled, "The ECA and Small Business," explains the various methods of organizing for overseas trade, listing the advantages and disadvantages of each method. Copies may be obtained at the Economic Cooperation Administration, 800 Connecticut Ave., N.W., Washington 25, D. C.

Isotox Dairy Spray

With government approval of the new insecticide Lindane for dairy barn fly control, the California Spray-Chemical Co., Richmond, Calif., announces their new wettable powder, Isotox Dairy Spray with 25% Lindane. The manufacturer states the new dairy spray kills flies faster than DDT and Methoxychlor, including those flies which have built up a resistance to DDT.

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Ask Probe Into Food Chemicals

A. J. Sabath, representative from Illinois, recently introduced in the House a resolution which would create a committee to conduct an investigation into the use of chemicals, insecticides and other pesticides in and with respect to food products.

The resolution, which was referred to the rules committee, closely parallels the one introduced some time ago by F. B. Keefe of Wisconsin.

No hearings have been scheduled as yet on either measure and, although there is much pressure behind both, it appears unlikely that any action will be taken at this session of Congress.

New Plant Quarantine Head

Roy G. Richmond, U. S. Department of Agricultural biologist, was recently named leader of the Bureau of Entomology and Plant Quarantine's division of Domestic Plant Quarantine, it was announced in Washington, D. C. by Dr. P. N. Annand, chief of the bureau. Richmond served since 1938 as first assistant to B. M. Gaddis, who died in August.

U.S.I. Synthetic Pyrethrum

William P. Marsh, Jr., president of U. S. Industrial Chemicals, Inc., recently announced that the so-called synthetic pyrethrum, based on the LaForge synthesis disclosed by the USDA in March, is now available. Mr. Marsh pointed out, however, that experimental work must be done before the synthetic pyrethrum can be introduced into insecticides.

Marine Borer Research

There is an interesting biographical sketch on William Clapp in the February 1949 issue of *Reader's Digent*. Clapp has a small laboratory in Duxbury, Mass., where he maintains the world research center for problems associated with marine borers, termites of the sea.

Increasing Infestation in Mont.

Termites, dermestids and household cereal insects are increasing in number in Montana, James H. Pepper, state entomologist, reports, his conclusions being based on the large number of requests for advice on control measures received at his Bozeman office.

The increase in inquiries about termites has been especially marked, Mr. Pepper says in his biennial 1947-48 report, released early this year. These come from every section of Montana with the exception of the northeast counties. Considerable damage to flooring and studding was observed in homes in Glendive and Billings and he adds that damage attributed to these insects is becoming more common from year to year.

Dermestids occur commonly all over Montana, judging from the reports of damage to food, clothing, carpets and furniture. During 1948 they were especially noticable in the vicinity of Great Falls.

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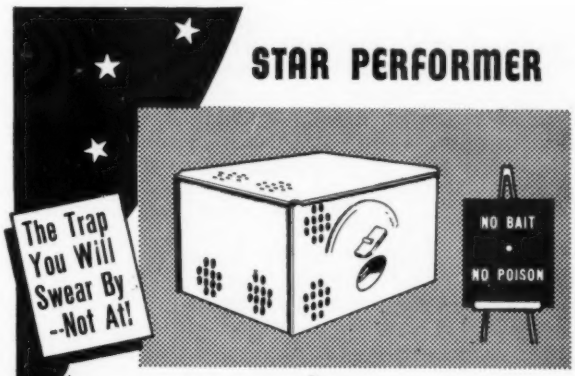

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Resistance to Insecticides

(Continued from page 26)

mation of their individual action against a given organism, but is found to be greater. The opposite, when a reduction in effect is produced, is known as "antagonism". Thatcher and Marmur (1948) have shown that some bacterial organisms, resistant to the separate agents, have demonstrated lack of ability to develop resistance against a synergistic combination. Some information is urgently needed regarding the resistance of insects not only to synergistic but also to ordinary combinations of insecticides, and this will probably be a fruitful field of investigation.

7. *Intensity of applications*: An interesting problem is the difference in the effect of producing resistance when varying degrees of care in application and strength of insecticide are employed. Low doses and careless distribution would permit more insects to survive, many of which would doubtless have varying degrees of resistance, permitting the building up of resistant strains. On the other hand, under field conditions, complete or "one hundred per cent control" is hard to obtain, and even with intensive and careful application a few survivors could be expected which would be those most likely to breed for increased resistance. Indeed, it is logical to deduct that the selective process would be hastened under these circumstances. Smith (1941) is also in agreement with this latter view, for he says, "The mechanics of race development are such that it is the most intelligent grower, the one who is painstaking and conscientious in the control of his pests, who will first be confronted with this problem. The region in which a certain pest control measure is applied most effectively and most generally is the one in which we can expect these population shifts to take place most definitely and most promptly." It should be pointed out, however, that these conditions, as visualized by Smith, would involve a certain definite isolation and restricted ability to cross-breed with untreated populations.

Summary

Definite conclusions in a subject of this nature are obviously difficult and dangerous to arrive at. However, enough is known from both the theory and the history which have been discussed in this article, to permit certain suggestions to be advanced.

I. Appearance of local insecticide resistant strains does not necessarily mean they will become widespread because:

A. If treatment is not universal, back breeding with natural populations may occur.

B. A strain resistant to insecticides may not be necessarily be so well adapted to other environmental conditions or be so prolific, and therefore in the absence of the insecticide the wild population may tend, sooner or later, to revert to the normal condition, especially if there is contact with untreated populations.

II. Unless there is an alteration in the genetic factors, such as the appearance of a mutation, a certain level of resistance will be attained which can be dealt with by increased dose, frequency of application, or more careful treatment.

III. An isolated area where most intensive and careful control measures have been undertaken is the place where resistant strains are most likely to appear.

IV. Individual adaption is a possibility in connection with sublethal doses.

ACKNOWLEDGMENTS

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Penick's Synthetic Pyrethrins

S. B. Penick & Co., 50 Church St., New York city, has announced the successful duplication of the synthesis of pyrethrum-like esters. Preliminary tests on flies indicate the synthetic material to be equal in toxicity to the natural. Further technical work remains to be done, but the new compound is now being made by Penick in limited quantities.

Outline of the process, developed after fifteen years' intensive research by chemists of the BEPQ at Beltsville, Md., was released by the government on March 15 so that investigation of it would be undertaken by industrial laboratories.

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MISTMASTER Ball Bearing Fan Type Sprayers have both the spread and the power to do a quick, thorough job. Driven by 1/3, 3/5, or 1 hp. motors, they spray insecticides for distances as far as 40 feet, penetrate into hard-to-reach places, and spray large areas quickly, completely.

Here is a sprayer that has more power than any other portable sprayer, yet is convenient and easy to handle. Equipped with 1-gallon non-corrosive tank, driven under low pressure with a high volume of air, it can be used with any type of insecticide, either oil base or water base, and carries insecticides into remote openings in full volume and power.

Used anywhere, it plugs into any electric outlet, and is supplied with three nozzles for fine, medium, or coarse spray, can also be furnished with 2-gallon tank and special nozzles or in special design to meet individual requirements.

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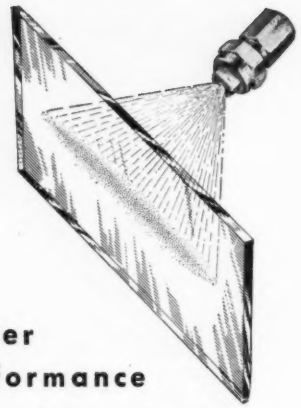

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PEST CONTROL

notebook

by

J. R. Gross

Find the Leaky Roof

Take one leaky roof. Mix well in some woodsy suburban area. Add one fertile "tent builder" queen. Allow the mixture to ferment and ripen for a few years. Then stand by for a phone call.

A colony of successfully-established tent builder ants can run into a population of many thousands. Like the carpenter ant they tunnel tirelessly into both rotten and solid timbers. Sometimes from basement to attic the fine sawdust particles gently drift and drive the housewife mad. In the normal course of events that drives the husband — to action.

Normally the "tent builders" live in stumps, fallen logs and trees. Like many other ants they cultivate aphids and tree hoppers as "ant cows." The name stems from the common habit of building protective paper tents to shelter a herd of "cows". It's scientific name is Crematogaster because the patent-leather abdomen is sweetly shaped like a little black heart with a stinger to the point. Literally a black hearted little monster.

When a colony lives close to the house the workers often invade it to search for food. Once in a while a colony will find conditions just right to completely take over. More often than not the perfect condition will be an indication of wet timbers.

Search for a leaky roof, leaky plumbing, faulty rain spouts or some other steady cause for wet timbers in the building.

Fly Ranch Flash

Recently we got to wondering just how thick fly specks could pile up in one season. The only way to find out was to visit the "Fly Ranch" I told you about in August. Luckily, some of the buildings had been painted early in the spring giving us a chance to get a fairly accurate measurement.

Heaviest deposits were slightly thicker than 1/8th inch. Over a period of two or more seasons, the deposits passed the quarter-inch mark. Imagine fly-specks piled on one another totaling more than a fourth of an inch even after drying and hardening! Incidentally the stuff hardens to about the consistency of well-seasoned tar.

One very interesting fact came to light when we pried off the deposits for measurement. White spotted spider beetles were actively breeding in the fly manure.

Outdoors it was about 60.5°F., just cool enough to keep most of the flies from seeking comfort at their favorite roosts. One building was warmer than the others, even though the windows were open, and the outer surfaces of the screens were thick with flies.

Don't Miss Extra Profits!

What's the best method for the wholesale destruction of adult insect forms? How do you handle jobs in package goods stores and warehouses, flour mills, food processing machinery, chutes, and shelves? What do you use to get thorough fast penetration — where residual effect is not desirable?

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Microsol is a compact, lightweight, heavy duty unit whose spinning disc breaks insecticide into tiny 20 micron particles — without using heat. Microsol gives complete fog coverage at the flick of a switch — reaches hard-to-get-into places — is a self-contained unit requiring only a source of electric power, A.C. or D.C. — is guaranteed for one year.

P C E distributes Microsol because P C E knows it's the most practical unit on the market . . . and that its factory established price is **right.**

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Model 202, illustrated, has a capacity of 1 qt. Complete with line cord control switch, and stand — only $87.50 f.o.b. Silver Creek, N. Y.

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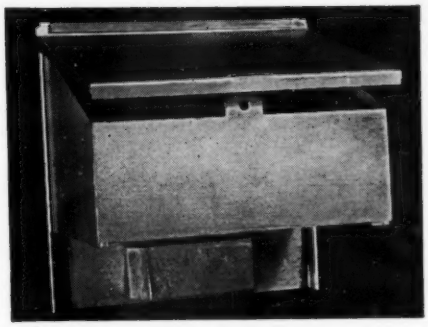

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ORGANIZATION NEWS

NY PEA Hears McCutcheon

The first fall meeting of the Professional Exterminators Association, Inc. of New York City, held at the American Museum of Natural History, Monday evening, September 12th, was highlighted with a scholarly talk by the well-known consulting chemist, John W. McCutcheon, who spoke on "Emulsions and Surface Active Agents." A copy of McCutcheon's recent study on "Synthetic Detergents — Main Types, Uses, Properties, and Prospects," was given to each member present.

At a business meeting which followed, a short course committee consisting of Ken Thompkins, chairman, David Cantor, Louis Simon and Alvin Weiss, was appointed to work out a program for a short course on pest control problems to be given sometime in the near future.

Among those present were: John W. McCutcheon; Jacob Huberman, Scientific Ext. Co.; David Cantor, Bell Ext. Co.; Ethel T. Thorpe, Tops Exterminating Service; Charles Pomerantz, Bell Ext. Co.; Mr. and Mrs. Snyder, Kraft Exterminators; Samuel Diner, American Pest Control Co.; Alfred Friedman, Friedman's Ext. Service; Irving Drucker, Banex Exterminating Co.; Mr. Albert, A & G Exterminating Co.; Raymond Sultzer, Gladius Exterminators; William Thorpe, Tops Ext. Service; John Gols, Metropolitan Vermin Ext. Co.; Alvin M. Weiss, Tri-Boro Ext. Co.; James A. Nelson, Pest Control Magazine; E. J. Palmer, John Powell & Co.; D. Schusterman, Royal Ext. Co.; Evelyn Huberman, Scientific Ext. Co.; Morris Feldman, Columbia Exterminating Co.; R. A. Phillips, San-I-Service Co.; Ken Tompkins, Tompkins Ext. Co.; Max Pollack, Royal Exterminators Supply Co.; Arnold Livingston, Chemical Insecticide Co.; N. Livingston, Chemical Insecticide Co.; Helena A. Whelan, R. J. Prentiss & Co., Inc., William Farrell, Effective Ext. Co.

E. Pa. PCA Meets In Scranton

The Eastern Pennsylvania Pest Control Association held its most recent meeting on September 15th in Hotel Casey, Scranton, Pa. It was a dinner meeting with Edward Yevics, assistant director of Scranton Public Health Department, discussing pest control relations in regard to public health. Benjamin Vanisky, Pennsylvania Department of Agriculture, spoke on bakery sanitation and James Dougherty, University of Scranton, gave the group some hints on salesmanship.

AAEE, Fla. PCA Meet in Dec.

The 1949 meetings of the American Association of Economic Entomologists and the Entomological Society of America will be held in Tampa, Florida, December 13-16. The Newell Entomological Society, the Cotton States branch of the AAEE, the Florida Entomological Society, and the Florida Pest Control Association will meet jointly with the two national organizations.

The Tampa Terrace Hotel will serve as headquarters for the AAEE, while the Hillsboro Hotel will be headquarters for the Entomological Society of America and the Florida Entomological Society. Room reservations must be sent directly to A. K. Dickinson, director, Convention and Tourist Bureau, Tampa Chamber of Commerce, P.O. Box 420, Tampa, Fla.

CALENDAR OF MEETINGS

National Pest Control Assn. Convention, Biltmore Hotel. Los Angeles, Cal., Oct. 17-19.

International Assn. of Milk and Food Sanitarians Conference, Deshler - Wallick Hotel, Columbus, Ohio, Oct. 20-22.

Municipal Public Health Engineers Conference, Hotel Statler, New York city, Oct. 23-24.

National Safety Congress Exposition, Chicago, Ill., Oct. 24-28.

American Public Health Assn., 77th Annual Meeting, New York city, Oct. 24-28.

Florida Structural Pest Control Board Examinations, University of Florida, Gainesville, Dec. 1, 2, 3. Interested parties should write Structural Pest Control Board, P.O. Box 2728, University Station, Gainesville, Fla.

Chemical Specialties Manufacturers Assn., (formerly NAIDM) Winter meeting, Mayflower Hotel, Washington, D. C., Dec. 4-5.

Florida Pest Control Assn., meeting in conjunction with AAEE national convention, Tampa Terrace Hotel, Tampa, Dec. 13-16.

A special and elaborate program of entertainment is being formulated for the ladies in attendance, according to the announcement made by Dr. John T. Creighton, chairman of the committee on arrangements.

Here's the way T. N. T. Exterminating Co., Akron, Ohio, has its TIFA fog applicator rigged out. Harold J. Portwood, company president stands in the middle of servicemen C. C. Martin (*left*) and J. H. Morrison (*right*).

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and your firm name and address on each package with a minimum order of 6 dozen either all one size or in combination of the 50c and $1.00 sizes to make 6 dozen. RED SQUILL HAS ALWAYS BEEN A POPULAR ITEM AND THE PUBLIC IS WELL EDUCATED TO ITS VALUE IN RAT CONTROL.

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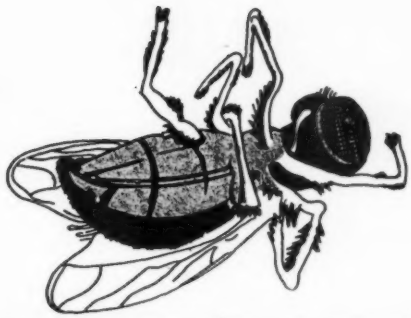

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A sweet chocolate bait that will produce excellent rat control on your service work, is economical to use for when distributed at the rate of 700 portions to the pound, each portion contains a lethal dose of thallium for an average size rat.

DIRECTIONS FOR USE — Place small dabs of paste on pieces of paper or spread paste on bread or sweet crackers.

SOLD TO THE PEST CONTROL OPERATORS ONLY — NOT FOR RESALE TO THE PUBLIC.

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Contains no vegetable or animal fats, will not become rancid and is odorless.

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Other ready to use Rat baits compounded with Red Squill and Antu. Also Thallium Sulphate poison grains for the control of mice.

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PESTALES

Free Autos Next?

We wonder when the well-meaning Junior Chamber of Commerce groups around this country will start using some common sense. The Jaycees down in Hillsboro, Texas, have set out on a campaign to control pests as a means of disease prevention. How are they going to do it? Simple. They're passing out 3,000 8-ounce containers of 10% DDT powder free of charge! Wonder if next they'll help the auto-less families in the country by giving them a new Packard so there'll be contentment everywhere. Get realistic, boys!

* * * *

Laundryman's Out

You pick up the laundry, check it over carefully, take a look at the stuff, then hit the ceiling. There are holes in the armpits of your shirts, holes in the sheets, holes in the handkerchiefs, so what do you do?

"Gimme dem laundry bums," you say, "I'll moideh dem," or maybe you're an Oxford chappie and you say, "I'll hand that laundry-monger his brains."

But, says A. John Plonski, a laundry expert speaking before a recent Jersey City Lions Club, mice are often to blame. Mice nibble at fabrics containing starch or food, hence the holes.

Plonski gave several other reasons for holes in our clothes when One Lung Lo returns holey laundry, but why drag in the poor defenseless mouse. He's our problem. Let him alone.

* * * *

Gum Drops for Mice

University of Vermont scientists say you can catch more mice with gum drops than with cheese. The gum drops are used in ordinary traps. When the mouse bites the confection, it sticks in his teeth — and WHAMBOO! he gets it in the neck. Profs say they caught 17 mice in one hour in the science hall, using only one gum drop.

Fermate Fungicide for Flowers

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Among those who have pioneered in its testing and use are Prof. L. M. Massey and Dr. A. W. Dimock of the Department of Plant Pathology at Cornell University.

Dr. Dimock reports that, "Properly used Fermate is safer than earlier fungicides, and is more effective against a variety of fungi. It is safe to use with a wider variety of insecticides and the deposit is more weathering.

Massey said that tests at Cornell have shown that it can effectively control black spot and rust on roses, diseases on chrysanthemums and the damping-off of seed rot of many flowers.

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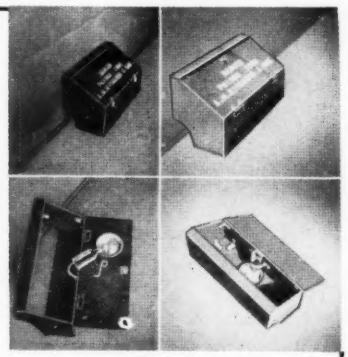

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NPCA Convention Story

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included: William J. Fox, reception; Ray M. Dewey, registration; J. Wilford Gunn, advertising and booth exhibits; George A. Taubert, entertainment; G. M. Culton, publicity; Mrs. Mary L. Hogan, ladies activities; and Martin T. Meyer, transportation. The officers of the National Pest Control Association, V. H. Montgomery, president, William O. Buettner, executive secretary and Robert C. Yeager, treasurer, worked with each of these committees.

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